UNITED STATES COAST GUARD

Report of the Marine Board of Investigation into the Commercial Fishing Vessel SCANDIES ROSE (O.N. 602351)

Sinking and Loss of the Vessel with Five Crewmembers Missing and Presumed Deceased South of Sutwik Island, Alaska on December 31, 2019

MISLE Activity Number: 6881487

U.S. Department of Homeland Security

United States Coast Guard

Commandant
United States Coast Guard

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THE SINKING AND LOSS OF THE COMMERCIAL FISHING VESSEL SCANDIES ROSE (O.N. 602351) SOUTH OF SUTWIK ISLAND, ALASKA RESULTING IN THE LOSS OF FIVE LIVES ON DECEMBER 31, 2019

ACTION BY THE COMMANDANT

The record and the report of the investigation convened for the subject casualty have been reviewed. The record and the report, including the findings of fact, analysis, conclusions, and recommendations are approved subject to the following comments. This marine casualty investigation is closed.

COMMENTS ON THE REPORT

1. The loss of the commercial fishing vessel SCANDIES ROSE and five crewmembers onboard was a tragic and preventable accident. The families of the crewmembers who lost their lives have my deepest condolences. The Coast Guard will take appropriate action on all that we have learned from this thorough investigation.

2. I want to thank members of the Marine Board of Investigation (MBI) for their hard work and dedication during this investigation. Through the public hearing and their efforts, the MBI was able to raise awareness on the hazards associated with operating in Alaskan waters in winter conditions and develop appropriate recommendations to help prevent similar occurrences.

3. The MBI found a major factor in this incident was the captain's judgment. Specifically, the captain departed on the accident voyage and later failed to seek shelter along his planned route despite a heavy weather forecast, vessel icing, and reports from other fishing vessel captains who sought shelter from the weather.

4. Another factor in this casualty was the weather conditions. The Coast Guard MBI determined that the initiating event for this incident occurred around 11:30 a.m. on December 31, 2019, when the SCANDIES ROSE maintained course and speed on its planned voyage track with weather forecasted to continue to deteriorate with heavy freezing spray and gale-force storm warnings. In conversation with the captain of the fishing vessel AMATULI, the captain of the SCANDIES ROSE reported the formation of ice on his vessel the morning of the accident but did not take actions to reduce icing formation or take early and timely

advantage of available safe and protected anchorages along his intended voyage track. Subsequent events include the vessel's reduction in and eventual loss of stability. This loss of stability was exacerbated as the vessel developed a dangerous list to starboard after making a 50-degree turn to starboard towards Sutwik Island. Subsequent events then included a loss of maneuverability, capsizing, flooding, and the vessel's sinking. Additional subsequent events included the loss of five of the vessel's crew and two surviving crewmembers entering the water, before making it to a life raft with eventual rescue.

5. The primary causal factors that directly contributed to the casualty include: 1) failure to take timely action to prevent excessive ice accumulation despite forecasted and anticipated heavy freezing spray conditions, 2) the vessel's unsafe stability conditions due to the inaccurate stability instructions provided by the naval architect who performed the last stability assessment and created the vessel's stability instructions in 2019, 3) carrying nearly the maximum number of crab pots permitted in the 2019 stability instructions despite commencing a voyage where gale force weather and heavy freezing spray were forecasted, 4) excessive ice weight accumulations from freezing spray, and 5) lack of effective federal stability regulations that do not realistically account for the dangerous effects of icing and the asymmetrical nature of icing that can endanger commercial fishing vessels operating in regions similar to this accident environment.

6. Other causal factors include the captain's decisions to: 1) not take timely action to prevent or mitigate excessive ice accumulations from the forecasted and anticipated heavy freezing spray conditions, 2) not create a means for the crew to safely move forward to observe and clear the accumulation of ice on the vessel, and 3) not attend stability training classes that were available. Also contributing to the casualty was the owner's selection of the "qualified individual" who failed to: 1) accurately examine the vessel, 2) perform stability tests and the calculations necessary to properly document the stability condition for the SCANDIES ROSE and 3) create detailed and accurate stability instructions for the captain. As a result, the owner failed to provide the captain of the SCANDIES ROSE with accurate and detailed information to maintain the vessel in a satisfactory stability condition.

7. The MBI identified the need for a detailed follow-up icing study in order to better understand the stability impacts on fishing vessels laden with oversized fishing equipment on their weather decks.

8. The Coast Guard has already taken several actions since the investigation to improve the safety of Commercial Fishing Vessels and those efforts will continue. The commercial fishing vessel industry should also take appropriate actions to prevent similar tragedies from occurring in the future.

ACTION ON RECOMMENDATIONS

Recommendation 1: Recommend that the Commandant of the Coast Guard partner with the National Commercial Fishing Safety Advisory Committee (NCFSAC) to establish a working group to draft and accept a Task Statement addressing safety of Commercial Fishing Vessels of less than 200 GTs. The Task Statement should specifically address the issues raised by this marine casualty, the total loss with fatalities of the SCANDIES ROSE, as well as the similar

losses of the DESTINATION and LADY OF GRACE, caused by vessel icing leading to a loss of stability. The Task Statement should address the following items:

1. In conducting the tasking, review the multi-year statistics (provided by the Coast Guard) regarding commercial fishing vessels of less than 200 GT accidents or losses that resulted in fatalities, injuries, or property damage. Major marine casualties in addition to this one, such as the loss of the DESTINATION, NO LIMITS, and other fishing vessels with multiple fatalities and vessel losses should be reviewed to provide the background information necessary to conduct the tasking and then make informed recommendations to the Coast Guard.

2. Examine and make recommendations to the Coast Guard on best practices to reduce and mitigate the negative consequences caused by the misalignment of state and Federal regulations regarding drug laws legalizing the recreational or medical uses for drugs also classed as dangerous drugs by federal law and applicable transportation related statutes. This is critical for the safety of operations and creating an environment for vessel personnel to work in a drug-free workplace, with special emphasis on critical safety sensitive jobs such as navigation and engineering duties to bring fishing vessels into alignment with other commercial vessels. Develop recommendations that include testing for pre-employment, routine, and reasonable cause.

3. Examine and effectively disseminate recommendations for best practices to ensure full crew access to all parts of a vessel to allow for safe vessel operation. This task should address and examine things like a means to access all areas of the vessel and allow the crew to safely move fore and aft to remove ice, inspect the vessel, and operate critical equipment like the vessel's anchors and similar gear that does not require the crew to climb over the pot stack (for example, in the case of a vessel carrying pots, nets or similar devices to create pathways for access).

4. Examine and make recommendations to the Coast Guard on a way to widely distribute personal locator beacons (PLBs) at minimal expense. Ensure availability and access for crewmembers of these critical lifesaving devices which could be acquired by consortiums, associations, or other organizations for distribution to vessel crews through federally funded grant programs or other programs.

5. Establish best practices for standard procedures and guidance for crew standing navigation watches. This should include a detailed crew orientation for each unique vessel, including the operation of critical equipment and establish clear and easily understood watchstanding orders to protect the safety of the vessel for its applicable operations. This could be accomplished as a standardized form or checklist.

6. Evaluate and provide a comprehensive list of recommendations to the Coast Guard, in the form of best practices (NVICs, policies, training), or amended or new regulations, regarding stability considerations which may pose severe risk to the safety of a fishing vessel such as icing, loading, the need for stability instructions, and vessel modifications. As part of this task, review the Coast Guard's current level of oversight, provide recommendations on its adequacy, and specify needed changes to areas of the fishing safety program that require additional attention.

7. Evaluate and provide recommendations to the Coast Guard for best practices to address the high degree of risk associated with fishing vessel operations and how the acceptance of risk is prevalent and accepted in the fishing industry. Specifically, the Marine Board recommends the committee focus on topics including icing, heavy weather avoidance in voyage planning, and formalizing the navigation watch duties via onboard familiarization and written standard orders to ensure the safety of vessel during its transit and during fishing operations.

8. Evaluate and provide recommendations to the Coast Guard to ensure the most effective means to widely disseminate critical safety information for the commercial fishing industry. This Marine Board investigation revealed that current means are not effective at making it to a large portion of the commercial fishing fleet.

> **Action:** I concur with this recommendation. The recommended task statements will be provided at a future convening of the NCFSAC for review and comment.

Recommendation 2: Recommend that the Commandant of the Coast Guard clarify the existing language in the requirements contained in 46 Code of Federal Regulations (CFR) 28.270(b)—participation in drills—regarding "donning" immersion suits. The regulatory intent was to have each member of the crew physically put on an immersion suit to satisfy the requirements of the regulation. More importantly, the intent was to get the tactile experience and increase crewmember ability to rapidly and properly don the suit in extreme conditions.

> **Action:** I do not concur with this recommendation. Title 46 CFR Part 28.270(b) specifically states, "donning immersion suits" are one of the drills all individuals onboard must participate in. Additionally, there are a significant number of Coast Guard and Alaska Marine Safety Education Association (AMSEA) documents related to drills onboard commercial fishing vessels that address this through the following:
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> - CVC-WI-016 - Fishing Vessel Drill Conductor Program Guidelines for Training Commercial Fishermen, Administration of Onboard Drills, and Acceptance of Training Courses;
> - USCG Dockside CFV Safety Examination;
> - U.S. Coast Guard Fishing Vessel Safety, Federal Requirements for Commercial Fishing Industry Vessels;
> - U.S. Coast Guard 17th District Ready for Sea Checklist; and
> - AMSEA Commercial Fishing Vessel Emergency Instruction & Drill Manual.

Recommendation 3: As previously noted in the DESTINATION Report of Investigation (ROI), recommend that the Commandant of the Coast Guard amend 46 CFR 28.550 - Icing, to clarify that the vessel's stability instructions to the master should indicate that when freezing spray forecasts or conditions exist, the vessel may experience icing conditions that dangerously compromise the vessel's stability and that captains shall consider delaying departure from port, or if already underway, seek protected waters or take immediate action to reduce or mitigate ice accumulations.

> **Action:** I do not concur with this recommendation. As stated in 46 CFR 28.530(a), the intent of stability instructions is to provide vessel operators enough information to

maintain the stability of their vessel. They should also take into account the conditions a vessel may be reasonably expected to encounter. The existing requirements in 46 CFR 28.550 provide guidance on the calculation of stability using standardized ice parameters for typical operational locations, not recommendations on risk assessment or safe vessel operation.

Prior to and since this incident, the Coast Guard has worked to address fishing vessel stability through the publication of safety bulletins and training guidelines. While none of these resources address the recommendation to consider delaying a departure from port, they do address seeking protection and removal of ice accumulation from vessels. Marine Safety Information Bulletin (MSIB) 01-21, *Improving Fishing Vessel Stability*, does recommend using all available meteorological resources to anticipate the potential for freezing spray. The guidance also stresses prudent seamanship and that it is the vessel master's responsibility to maintain satisfactory stability at all times.

Recommendation 4: Recommend that the Commandant of the Coast Guard, specifically, the Office of Commercial Vessel Compliance (CG-CVC), collaborate with marine training institutions like the North Pacific Fishing Vessel Owners Association (NPFVOA) and AMSEA seeking to amend their curriculums as appropriate for operating areas with icing conditions. The effort should increase the focus on the dangers of icing and other potential sources for loss of stability and provide for recommended best practices to reduce icing or causes of loss of stability. This could include protective measures such as dropping gear overboard when in dangerous stability condition, not getting underway in the face of severe weather, or seeking shelter if already underway.

Action: I concur with this recommendation. In 2019, the U.S. Coast Guard partnered with the NFPVOA and the AMSEA in the program review and concurrence of their fishing vessel stability curriculum outlines. NFPVOA and AMSEA course curriculums focus on a variety of stability related content, which includes icing loads and conditions. Icing curriculum includes topics such as actions to minimize icing and icing loads, ice removal, trip planning; icing condition considerations, intact stability, and determining the vessel's center of gravity.

The Coast Guard National Maritime Center (NMC) subsequently accepted the curriculums, and the approved courses are listed on their public website at https://www.dco.uscg.mil/portals/9/NMC/pdfs/courses/courses.pdf?ve.

Recommendation 5: Recommend that the Commandant of the Coast Guard, specifically the MSC, create a mechanism to track quality related issues pertaining to stability work involving professional engineers/naval architects. Develop a formal mechanism to provide feedback to regulatory bodies overseeing naval architects and professional engineers after identifying deficiencies in the quality of work that affect vessel safety.

Action: I partially concur with this recommendation. The Coast Guard Marine Safety Center (MSC) reviews commercial vessel plans and calculations, including stability calculations. Any deficiencies identified during a review are documented, and the deficient material is returned to the submitter for revision and resubmission before approval. The MSC tracks the number of identified discrepancies found in submitted

plans. Under Navigation and Vessel Inspection Circular 10-92, Change 2 (NVIC 10-92) qualifying submissions to the MSC, prepared by registered professional engineers (PEs), receive expedited review. The MSC tracks which plans and calculations are submitted under NVIC 10-92. The Coast Guard does not require a submitter to hold a PE's license to complete and submit a commercial vessel design for engineering plan review because expedited review under NVIC 10-92 is a voluntary program. PE's licensing, administration, and oversight is regulated by the state in which the license is issued.

The current expedited review process in practice identifies quality related issues and provides a mechanism to address these issues with PEs. MSC staff and their supervisors are familiar with the quality of information submitted by PEs and use this knowledge when determining the scope of review to be performed on individual submissions. The MSC informs PEs when significant or repeated errors or omissions are discovered during plan review. If further errors are detected, the MSC notifies the submitter that their NVIC 10-92 status has been revoked, and that any future submissions will be scrutinized during normal plan review. The MSC will not reinstate the NVIC 10-92 priority status until satisfied that the professional engineer has demonstrated a history of satisfactory submittals and understanding of the authorities and limitations of NVIC 10-92. Thus, the current expedited review process provides a sufficient level of quality control, oversight, and communication between MSC and PEs.

Moreover, the Coast Guard is not permitted to disclose sensitive information without proper authorization under Department of Homeland Security (DHS) policy. Currently, the Coast Guard does not have authority under statute or regulation to authorize a disclosure to an individual's state engineer licensing board. Even with authorization, the Coast Guard disagrees that reporting deficiencies made by PEs should be adopted as an agency policy. Doing so would discriminate against licensed engineers and would encourage submissions made by unlicensed engineers, which could erode trust and open communication between the MSC and PEs. Additionally, domestic and international vessel design and engineering regulations, standards, and policies are often complicated, requiring a certain level of expertise to interpret. Although mistakes occasionally occur in plan drafting, they are rectified as a normal part of the vessel design and approval process due to the open communications between the MSC and design engineers.

Recommendation 6: Recommend that the Commandant of the Coast Guard, specifically CG-5P and other applicable offices, determine the real-life icing effects on commercial fishing vessels, specifically the asymmetrical nature of accumulation on the vessel and pots, and amend 46 CFR 28.550 to improve the margin of safety for vessels operating in such harsh environments. The Coast Guard Research and Development Center (RDC) Ice Accretion on Crab Pots Rapid Evaluation & Analysis of Critical Technologies (REACT) report is a baseline study and can serve as a starting point for this effort to build more effective regulatory icing standards.

Action: I partially concur with this recommendation. The Coast Guard will analyze the results of the REACT Ice Accretion on Crab Pots report and a follow-up icing study conducted by the U.S. Coast Guard Academy in order to determine whether additional studies or revisions to regulations related to vessel icing, or any other alternative actions, are warranted.

Recommendation 7: Recommend that the Commandant of the Coast Guard develop regulations that require commercial fishing captains of documented vessels operating beyond the boundary line attend and complete an accepted stability training course. Doing this would align the regulations with the 2010 CGAA which added a subsection in 46 USC §4502 that required an individual in charge of a commercial fishing vessel that operates three nautical miles beyond the territorial sea baseline to pass a training program and hold a certificate issued under that program.

> **Action:** I concur with this recommendation. In 2016 the Coast Guard stated, in Federal Register / Vol. 81, No. 119, that training would be the subject of future regulatory action. While it has not yet moved forward with this regulatory action, course outlines were developed by the Commercial Fishing Vessel Safety Advisory Committee and Coast Guard processes were established to evaluate and approve courses to meet the added requirements in Title 46 United States Code (USC) §4502. Specifically, 46 USC 4502(g)(2) mandates that an individual in charge of a commercial fishing vessel who operates three nautical miles beyond the territorial sea baseline pass a training program and hold a certificate issued under that program.
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> Although the regulatory project remains a pending Coast Guard priority, development of the courses to fulfill the eventually training requirements have been developed and are currently available on a voluntary basis. In 2019, the U.S. Coast Guard Office of Commercial Vessel Compliance – Fishing Vessel Safety Division (CG-CVC-3) partnered with the NFPVOA and the AMSEA in the Program review and concurrence of their fishing vessel stability, firefighting, and damage control curriculum outlines. The Coast Guard NMC subsequently accepted the curriculums, and the approved courses are listed on their public website at: https://www.dco.uscg.mil/portals/9/NMC/pdfs/courses/courses.pdf?ve.

Recommendation 8: Similar to the recommendation made in the DESTINATION ROI, recommend that the Commandant of the Coast Guard amend 46 CFR Part 28 to require CFV owners and captains implement vessel policies to address crew rest, work hours and fatigue. Implementing regulations to require fishing vessels to implement vessel policies reflecting the basic principles of the Coast Guard's Crew Endurance Management System (CEMS) or similar practices that can be used to identify and control crew fatigue risk factors.

> **Action:** I partially concur with this recommendation. CEMS or similar practices are highly encouraged, although adoption of these concepts is optional. CG-CVC's Voluntary Safety Initiatives and Good Marine Practices for Commercial Fishing Industry Vessels includes recommendations on combatting fatigue. The Coast Guard will promote adoption of CEMS or similar practices by CFV owner and operators through Coast Guard District outreach initiatives. CEMS has been embraced and is successfully used on a voluntary basis within the towing industry. If adopted as intended, CEMS or similar practices could enhance the safety of the fishing industry.

Recommendation 9: Recommend that the Commandant of the Coast Guard, specifically, CG-CVC and CG-ENG, promptly produce and disseminate a Marine Safety Information Bulletin or Safety Alert discussing a best marine practice to ensure a means of access to all parts of a fishing

vessel, such as an alleyway through the pot stack or along one side of the stack, while the vessel is underway/operational in inclement conditions. In doing so, fishermen will have a safer way to maintain a clearer picture of the materiel and stability condition of their vessel in icing conditions and can take steps to mitigate negative forces before the loss of stability becomes catastrophic. The Coast Guard should collaborate with marine training institutions like the NPFVOA and AMSEA in ensuring widest distribution of this message to the commercial fishing industry.

Action: I concur with the intent of this recommendation. Marine Safety Information Bulletin (MSIB) 01-21 and Marine Safety Alert (MSA) 11-17 have been published to encourage best marine practices and situational awareness to fishing vessel operators and crews, in regard to safe loading conditions to include deck gear placement and load concerns, stability instructions familiarity, addressing icing conditions and mitigation measures, being aware of assumptions and conditions, being cognizant of vessel capabilities, and setting operational expectations to ensure crews incorporate safety procedures.

As discussed in the response to Recommendation 4, the Coast Guard has partnered with NFPVOA and AMSEA to develop voluntary course curriculums that address the best practice of ensuring all parts of the fishing vessel are readily accessible to the crew, especially when anticipating or encountering inclement weather.

A brochure summarizing key MBI findings and lessons learned will be distributed by the Coast Guard following the public release of the ROI and this Final Action Memorandum. The brochure will cover operational safety information for commercial crabbing vessels including the importance of maintaining an access alley within the stacked crab pots on deck. Once finalized, it will be publicly available on the Coast Guard's Marine Casualty website: https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Inspections-Compliance-CG-5PC-/Office-of-Investigations-Casualty-Analysis/Marine-Casualty-Reports/ and also provided to NFPVOA and AMSEA for potential incorporation into voluntary course curriculums.

Recommendation 10: Recommend that the Commandant of the Coast Guard promote the use of a properly installed and configured Digital Selective Calling feature on marine VHF radios throughout the maritime regions of the U.S. aboard all vessels, as this will enhance the saving of life and property and the potential timeliness of rescue in marine emergencies. This safety initiative to promote the widespread use of VHF marine radios DSC features should be added to the scope of duties, checklists, and job aids used by Coast Guard personnel and Coast Guard Auxiliarists conducting marine safety related outreach to the marine community, including the recreational boating community.

Action: I concur with this recommendation. The Coast Guard agrees that there is value in promoting the use of a properly installed and configured Digital Selective Calling feature on marine VHF radios throughout the maritime regions of the U.S. aboard all vessels. The Coast Guard will further evaluate this safety recommendation and coordinate a viable course of action with appropriate resources.

Recommendation 11: Recommend that the Commandant of the Coast Guard, specifically CG-CVC in partnership with NCFSAC (National-Commercial Fishing Safety Advisory Committee), promote and encourage CFV owners and captains to attend training classes in safety and navigation related subjects such as those offered by various training institutions such as the NPFVOA and AMSEA.

Action: I concur with this recommendation. The Coast Guard remains committed to continuing the partnership with NCFSAC in order to promote and encourage Commercial Fishing Vessel crews to attend safety training classes.

The NCFSAC supported the training task-recommendation that shaped the content of the AMSEA and the NPFVOA commercial fishing vessel courses. In 2019, CG-CVC-3 partnered with the NFPVOA and AMSEA to complete the review and gain concurrence of their fishing vessel stability curriculum outlines. Course curriculum subjects include safety training on the following topics: navigation, drills, firefighting, lifesaving, crewmember survivability, damage control, and crew response/decision making.

The Coast Guard NMC subsequently accepted the curriculums, and the approved courses are listed on their public website at the following website: https://www.dco.uscg.mil/portals/9/NMC/pdfs/courses/courses.pdf?ve.

Recommendation 12: Recommend that the Commandant of the Coast Guard, specifically CG-761, examine and close the automatic identification system (AIS) and Rescue 21 (R21) coverage gaps that exist in Alaska to ensure the effectiveness of Coast Guard operations as well as meet national security requirements. As efforts to reduce coverage gaps in D17 partially rely on the work of industry partners, it is strongly recommended that Coast Guard initiatives include collaboration with existing industry partners and utilization of already available communications technology, such as the AIS/DSC capabilities of the Marine Exchange of Alaska.

Action: I concur with this recommendation. The Coast Guard is developing new operational requirements through the DHS Joint Requirements Integration and Management System (JRIMS) process for both follow-on R21 and AIS marine communications systems. These efforts will include an analysis of coverage gaps for both marine VHF (R21) and AIS capabilities in the Alaskan region. Additionally, the Coast Guard is sponsoring a distress alerting gap analysis with the DHS Science &Technology (S&T) Directorate, which will demonstrate and recommend viable approaches to use commercially available space-based solutions to augment the R21 system. The Coast Guard will continue to collaborate with the Marine Exchange of Alaska and other industry partners to utilize existing and planned marine VHF and AIS solutions to close the coverage gaps throughout the Alaskan region.

Recommendation 13: Recommend that the Commandant of the Coast Guard, specifically the Coast Guard Office of Search and Rescue (CG-SAR) and Pacific Area (PACAREA) reexamine SAR readiness and mission response standards to improve chances of recovery. While an abbreviated SAR case study has been conducted by the Coast Guard for this accident, the unique demands and challenges posed by this accident and similar accidents in remote Alaskan waters

require that a full scope SAR case study with recommendations for improving Coast Guard rescue operations.

Action: I concur with the intent of this recommendation. The Seventeenth Coast Guard District conducted an exhaustive SAR Case Review of the Coast Guard's response to the sinking of the SCANDIES ROSE, which was reviewed and endorsed by PACAREA. Although named a Case Review, versus a Case Study, it was conducted in the format and with the thoroughness commensurate with a full scope Case Study. This Case Review identified resource gaps that would provide an improved level of readiness and response for SAR operations in Alaska. Furthermore, the ongoing Vice Commandant-directed SAR System Evaluation and Future Coastal/Shore Risk Assessment and Asset Laydown study is currently examining SAR readiness and mission response. An outcome of this study will be a proposed evaluation and reporting framework to assess the Coast Guard SAR System, which will inform potential adjustments to enterprise response standards. Finally, there have been several other studies to examine resource gaps and SAR responses. Two such examples of these studies include the Search and Rescue Summer Study Final Report dated December 5, 2019, and the Arctic Search and Rescue, Report to Congress of March 13, 2017. These studies, various other studies, and investigations have provided actionable recommendations that may improve SAR mission effectiveness.

Recommendation 14: Recommend that the Commandant of the Coast Guard continue outreach efforts to improve dissemination of the message to the maritime community to address the misalignment between state and federal drug laws. It is critical to reinforce the message that the use of dangerous drugs, positive drug tests, or actual impairment may lead to enforcement actions at the state or federal level up to including criminal prosecution.

Action: I concur with the intent of this recommendation. While the MBI noted in the ROI their concerns of the use of dangerous drugs as a "Finding of Concern", it will be more appropriate to publish as a Marine Safety Information Bulletin (MSIB). In 2014, Marine Safety Information Bulletin 02-14 was published to address recreational and medicinal marijuana use policies for Maritime Transportation Workers. Another MSIB will be published to highlight the additional concerns as identified by the MBI specific to the Commercial Fishing Vessel industry and published to the following website: https://www.dco.uscg.mil/Featured-Content/Mariners/Marine-Safety-Information-Bulletins-MSIB/.

Recommendation 15: Recommend that the Commandant of the Coast Guard, specifically the Assistant Commandant for Prevention Policy (CG-5P) elicit expertise from marketing and advertising professionals to better disseminate important safety information, such as "A Best Practice Guide to Vessel Stability, Second Edition" which is available on the CG-CVC-3 website. In addition, this knowledge should be implemented to other aspects of the CFVS Program to meet mandates of the Commercial Fishing Vessel Safety National Communications Plan.

Action: I concur with this recommendation. CG-5P and CG-CVC-3 will work with the Coast Guard Office of Governmental & Public Affairs (CG-0922) to explore additional outreach measures to expand the Coast Guard's communications and dissemination of

existing safety information with the commercial fishing vessel industry. CG-0922 will post the SCANDIES ROSE investigation on the Coast Guard Maritime Commons website along with links to important CFV safety information.

Recommendation 16: Recommend that the Commandant of the Coast Guard, including but not limited to CG-5P and CG-SAR, partner with marine industry to promote the wearing and use of PLBs. Conduct education and outreach to promote availability and benefits that increase chances of survival and rescue. Such outreach efforts can include developing safety alerts, establishing Coast Guard presence at Maritime Expos or events that draw the maritime community, attending industry workshops, or hosting local industry days with CFV owners, operators, and crew.

Action: I concur with this recommendation. The Coast Guard plans to publish an Advanced Notice of Proposed Rule Making (ANPRM) in order to obtain input from a broad and diverse group of mariners, equipment manufacturers, and vessel operators due to the wide range of commercial vessels in different services and on varied routes that could be impacted by a PLB requirement. The Coast Guard is also aware that emerging technologies now offer multiple distress alerting options for individuals. In the interim, the Coast Guard will continue to encourage voluntary carriage of PLBs or similar locating devices during industry engagements and outreach events with recreational boaters.

Recommendation 17: Recommend that the Commandant of the Coast Guard, specifically CG-CVC, conduct effective and widespread outreach to educate mariners on abandon ship procedures to ensure proper deployment and device activation of the EPIRB allowing it to transmit the distress alert signal which would result in the receipt of the distress signal by rescue forces.

Action: I concur with this recommendation. The Coast Guard agrees that outreach to educate mariners on proper deployment and device activation of the EPIRB in emergency situations will have value to the maritime industry. CG-CVC-3 will evaluate and pursue appropriate outreach measures.

Recommendation 18: Recommend that the Commandant of the Coast Guard direct Coast Guard investment in modernizing the VHF land-based assets in D17 to meet Sea Area A1 requirements with special attention to design parameters enabling that communications equipment to handle the extremes of the Alaskan environment. Additionally, the Coast Guard must ensure that the HF radio program remains in place and operational in the D17 AOR to support an effective SAR program.

Action: I concur with this recommendation. The Coast Guard prioritized available funding and resources to support R21 modernization efforts in Alaska to meet Sea Area A1 requirements[1] where coverage exists. These efforts include the recapitalization of

[1] The Coast Guard defines Sea Area A1 as those areas where more than ninety percent of the area within 20 nautical miles seaward of the territorial baseline along the East, West and Gulf Coasts of the United States, excluding Alaska, and including Hawaii, Puerto Rico, Guam, the Virgin Islands of the United States and the Northern Mariana Islands of Saipan, Tinian and Rota, is within coverage of Coast Guard very high frequency, or VHF Coast Stations that provide both a continuous watch for Digital Selective Calling, or DSC, distress alerts on Channel 70 and a capability to respond to distress alerts.

power generators, microwave data links, radios, and network infrastructure. Due to the challenges created by the vast area and unique terrain characteristics of Alaska, the Coast Guard has not declared Sea Area A1 in Alaska. The Coast Guard is developing new operational requirements for the follow on R21 system, which will consider an expansion of R21 coverage in Alaska. Additionally, the Coast Guard is investing in modernizing HF communications equipment as the Coast Guard intends to retain HF distress monitoring services in Alaska.

Recommendation 19: Recommend that the Commandant of the Coast Guard work with IMO and the life raft manufacturing industry to examine and consider the improvement of lighting on life rafts and other survival equipment. This would include the use of the newest available lighting technology (i.e., LED lighting, laser flares, and beacons) to increase the range of detection, illumination, reliability of lamps leading to an increased amount of interior/exterior lighting and increasing the probability of survivability and rescue.

Action: I concur with this recommendation. The Coast Guard is committed to providing boaters and mariners the best available technology to alert others to a distress condition, and to indicate both broad and precise locations to rescuers. The Coast Guard has chartered the Distress Signals Policy Council (DiSPoCo) to ensure that the requirements for approval and carriage of such items are aligned with the current SAR capabilities. The Coast Guard has added this recommendation as a priority initiative for the DiSPoCo to address.

Recommendation 20: Recommend that the Commandant of the Coast Guard accept and implement the recommendations contained in the SCANDIES ROSE SAR Case Review.

Action: I partially concur with this recommendation. CG-SAR evaluated the SCANDIES ROSE Case Review and promulgated a FAM. There were two recommendations which were forwarded to the Office of Aviation Forces (CG-711) that recommended increasing MH-60s and staffing at Air Station Kodiak.

I concur with the recommendation to provide additional MH-60s to Air Station Kodiak. As a result, the Air Station Kodiak MH-65 helicopter frames are scheduled to be replaced in 2025 with the MH-60T helicopter frame.

I do not concur with the recommendation for increasing the staffing levels at Air Station Kodiak. Although adding personnel to Kodiak's Personnel Allowance List may appear to increase the Bravo 0 posture of the unit, readiness posture is predicated on the number of aircraft assigned, not the number of personnel. Allocating additional MH-60Ts to Air Station Kodiak will enable the operational commander greater flexibility to meet readiness throughout the unit's area of responsibility.

Recommendation 21: Recommend that the Commandant of the Coast Guard, specifically CG-5PC, release a Safety Alert regarding the value gained in properly configuring a marine VHF radio to enable the use of a DSC alert and provide users with the necessary steps configure the DSC function.

Action: I concur with this recommendation. On March 2, 2023, Marine Safety Alert 03-23: ENSURING PROPER CONFIGURATION OF DIGITAL SELECTIVE CALLING (DSC)-EQUIPPED RADIOS was published and it is available at the following website: https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Inspections-Compliance-CG-5PC-/Office-of-Investigations-Casualty-Analysis/Safety-Alerts/.

Recommendation 22: Recommend that the Commandant of the Coast Guard direct the appropriate Headquarters office(s) to implement the provisions of the 2010 CGAA and 2012 CGMTA relating to commercial fishing vessels.

Action: I concur with this recommendation. The rulemaking project to implement select mandatory provisions of the 2010 – 2012 legislation is active. USCG-2012-0025 RIN 1625-AB85 (2016) "Commercial Fishing Vessels - implementation of 2010 and 2012 Legislation" is included on the Coast Guard's Unified Agenda, which lists the current and projected Coast Guard rulemakings. The background and current status of USCG-2012-0025 RIN 1625-AB85 can be found at the following site: https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201810&RIN=1625-AB85.

Recommendation 23: It is recommended that the Commandant of the Coast Guard, specifically CG-CVC working with the SCANDIES ROSE Marine Board, develop a user-friendly abbreviated version of this report containing key findings of this report and containing relevant information from the DESTINATION ROI and the RDC's Ice Accretion on Crab Pot Report in text and image form content, where appropriate. This printed and digital guide would be developed for the purpose of widespread distribution to the appropriate segment of the commercial fishing industry (cold water operating environments).

Action: I concur with this recommendation. CG-CVC and CG-INV will work collaboratively to develop the recommended printed and digital guide. Once finalized, the guide will be distributed to the commercial fishing industry and incorporated into fishing vessel exams in cold water operating environments.

Administrative Recommendation 1: In absence of applicable regulations, recommend that the commercial fishing industry voluntarily adopt requirements outlined in 46 CFR Part 57 for the use of certified marine welders when conducting work on steel hull commercial fishing vessels. Use of procedures outlined in the Coast Guard's NVIC 7-68 (Guidelines for steel vessel hull repair) and American Welding Society (AWS) Standards for Welders are accepted best practices to determine that quality repairs have been completed.

Action: I concur with the intent of this recommendation. The Coast Guard will provide this recommendation and the ROI to NCFSAC for their consideration and potential engagement with the commercial fishing vessel industry.

Administrative Recommendation 2: Recommend the National Weather Service make forecasting as well as existing models on freezing spray and icing more operationally available and easily accessible to the maritime community. It is critical that the NWS enhance their

weather products to incorporate applications such as the experimental freezing spray forecast and create easily accessible, user-friendly interfaces to improve vessel safety.

> **Action:** I concur with the intent of this recommendation. The Coast Guard will provide this recommendation and the ROI to the National Weather Service for their consideration and potential action.

Administrative Recommendation 3: Recommend the National Weather Service incorporate the data provided by the AIS based weather sensors, maintained by Marine Exchange of Alaska, into the forecasting models for the Alaska region.

> **Action:** I concur with the intent of this recommendation. The Coast Guard will provide this recommendation and the ROI to the National Weather Service for their consideration and potential action.

Administrative Recommendation 4: Recommend the National Weather Service explore and investigate a means to update the weather message content in all appropriate National Weather Service products to provide an explanation of statements such as "Freezing Spray" and "Heavy Freezing Spray" conditions, providing information that is found in the National Weather Service Glossary, on the potential rate of ice accumulation from freezing spray in inches per hour for each classification of freezing spray. Providing this information facilitates mariners' ability to appropriately manage the risk from freezing spray along their intended route.

> **Action:** I concur with the intent of this recommendation. The Coast Guard will provide this recommendation and the ROI to the National Weather Service for their consideration and potential action.

Administrative Recommendation 5: Recommend that the National Oceanic and Atmospheric Administration (NOAA) and the Marine Exchange of Alaska, in conjunction with any other applicable governmental or non-governmental organizations/stakeholders, enhance partnerships to establish a more extensive network of reliable weather stations in coastal regions to gather more accurate weather information for the transportation industry in the remote regions of Alaska.

> **Action:** I concur with the intent of this recommendation. The Coast Guard will provide this recommendation and the ROI to NOAA and the Marine Exchange of Alaska for their consideration and potential action.

Administrative Recommendation 6: Recommend the Federal Communications Commission (FCC) examine and amend existing regulations where required and revise FCC Public Notice DA 16-63. This change should require any commercial vessel be equipped with a VHF marine radio that has a properly configured DSC feature with an interconnected GPS, MMSI programmed, and ready for immediate use including within the State of Alaska (which is presently excluded) and adjacent waters. The Marine Exchange of Alaska has installed DSC receivers on its AIS towers since the accident and is continuing to expand that network. These additional DSC receivers would enable receipt of DSC distress alerts and potentially facilitate a reduction in the time it takes for Coast Guard and other rescue forces to reach vessels distress.

Action: I concur with the intent of this recommendation. The Coast Guard will provide this recommendation and the ROI to the FCC for their consideration and potential action.

Administrative Recommendation 7: Recommend that the State of Alaska implement a new measure in the Alaska Administrative Code, where appropriate, to close the safety gap where crabbers participating in the Bering Sea/Aleutian Islands Individual Fishing Quota (IFQ) Crab Fisheries Management Plan are required to report to the Coast Guard prior to departing port and vessels with similar gear are not required to report. In Section 5 AAC 39.670 - (7) an operator of a vessel participating in an IFQ, Community Development Quota (CDQ), or Adak community allocation crab fishery in the Bering Sea/Aleutian Islands area must notify the United States Coast Guard at least 24 hours before departing port when carrying crab pot gear; whereas the same vessel when fishing with modified crab pots of the same size for groundfish and, facing the same vessel stability risks, are not required to make these safety related reports prior to departure.

Action: I concur with the intent of this recommendation. The Coast Guard will provide this recommendation and ROI to the Alaska Department of Fish and Game for their consideration and potential action.

Administrative Recommendation 8: Recommend that the Washington State Board of Registration for Professional Engineers and Land Surveyors be provided with a copy of this ROI and examine it for information relating to the quality and accuracy of the stability work performed by the P.E./Naval Architect who conducted the stability testing and provided the stability instructions for the SCANDIES ROSE in 1988 and 2019 and continues to conduct stability work on vessels throughout the West Coast.

Action: I concur with the intent of this recommendation. The Coast Guard will share this investigation report with the Washington State Board of Registration for Professional Engineers and Land Surveyors for their consideration and potential action.

Administrative Recommendation 9: Recommend that the Commandant of the Coast Guard provide widest dissemination of this report throughout the CFV industry to include:

- Coast Guard District Fishing Vessel Coordinators
- To training institutions (AMSEA, NPFVOA, and others) for use as a case study. The purpose is to reach the intended audience of commercial fishing vessel crews, owners, and operators of and communicate the importance of taking timely and effective action at the first sign of emergency, to take action and maximize the chances of survivability for vessel and crew.
- Major fishing vessel associations in the Pacific Northwest and Alaska.
- In this case, it is critical that Commandant reach out to the WA State regulating body for naval architects and Professional Engineers.

Action: I concur with this recommendation. In addition to the distributions listed in the recommendation, the Coast Guard will publish this ROI and FAM for the public on the following website: https://www.dco.uscg.mil/Our-Organization/.'Assistant-Commandant-for-Prevention-Policy-CG-5P/Inspections-Compliance-CG-5PC-/Office-of-

Investigations-Casualty-Analysis/Marine-Casualty-Reports/. The results of the investigation and the ROI will also be announced and made available in a blogpost on the Coast Guard's Maritime Commons website: https://www.news.uscg.mil/maritime-commons/.

Administrative Recommendation 10: It is recommended that the participating crews of Air Station Kodiak and the Coast Guard Cutter MELLON be commended for their search and rescue efforts after the loss of the SCANDIES ROSE.

Action: I concur with this recommendation. This recommendation and the ROI will be provided to Coast Guard Pacific Area for their consideration and potential action.

[redacted]

P. W. GAUTIER
Vice Admiral, U.S. Coast Guard
Deputy Commandant for Operations

U.S. Department of Homeland Security
United States Coast Guard

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16732

MEMORANDUM

From: [redacted]
D. B. Abel, VADM
CG-DCO

To: G. A. Callaghan, CDR

Subj: MARINE BOARD OF INVESTIGATION CONCERNING THE SINKING OF THE COMMERICAL FISHING VESSEL (CFV) SCANDIES ROSE (O.N. 602351) APPROXIMATELY 170-NM SOUTHWEST OF KODIAK, ALASKA, WITH MULTIPLE LOSS OF LIFE

1. Pursuant to the authority contained in Title 46, United States Code (U.S.C.), Section 6301 and the regulations promulgated thereunder, you are to convene a Formal Marine Board of Investigation consisting of the following membership. The Board will convene as soon as practicable to inquire into all aspects of the subject casualty at such times and places as directed by you.

- CDR Gregory Callaghan, USCG, Chairman
- LT [redacted] USCG, Legal Counsel
- Mr. [redacted] USCG, Member
- LT [redacted] USCG, Recorder

2. The Board will thoroughly investigate the sinking and loss of life of the CFV SCANDIES ROSE (O.N. 602351) in accordance with all applicable statutory and regulatory mandates. Upon completion of the investigation, the Board will issue a report to the Commandant with the evidence collected, the facts established, and its conclusions and recommendations. Conclusions or recommendations concerning commendatory actions or misconduct which would warrant further inquiry shall be referred by separate correspondence to the cognizant District Commander for consideration and action as appropriate. A daily summary of significant events shall be transmitted to Commandant (CG-INV) while the Board is in formal session.

3. Complete and submit your investigative report to Commandant (CG-INV) within 12 months of the convening date. If this deadline cannot be met, a written explanation for the delay and the expected completion date shall be submitted. You are highly encouraged to submit any interim recommendations intended to prevent similar casualties, if appropriate, at any point during your investigation.

4. The National Transportation Safety Board (NTSB) is also charged with the responsibility of determining the cause or probable cause of this casualty by the Independent Safety Board Act of 1974 (49 U.S.C. 1901, et. seq.) and it may designate a representative to participate in any formal

MBI sessions. The NTSB representative may make recommendations regarding the scope of the inquiry, may identify and examine witnesses, and/or submit or request additional evidence.

5. The Commandant (CG-INV) will furnish such funding, technical experts and/or technical assistance as may be required by the Board when deemed appropriate and within the requirements for the scope of this investigation. Commander, Seventeenth Coast Guard District and Commander, Thirteenth Coast Guard District will also provide such administrative, logistical, and/or legal support as may be required.

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Copy: CG- LMI
PACAREA(5)
CCGD17(dp)
CCGD13(dp)
Sector Anchorage

U.S. Department of Homeland Security

United States Coast Guard

Commander
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Gregory.A.Callaghan@uscg.mil

16372
24 July 2020

MEMORANDUM [redacted]

From: G.A. Callaghan, CDR

To: CG-DCO
Thru: CG-INV

Subj: MARINE BOARD OF INVESTIGATION CONCERNING THE SINKING OF THE COMMERCIAL FISHING VESSEL (CFV) SCANDIES ROSE (O.N. 602351) APPROXIMATELY 170-NM SOUTHWEST OF KODIAK, ALASKA, WITH MULTIPLE LOSS OF LIFE

Ref: (a) SCANDIES ROSE MBI Convening Order Memo signed by DCO on 16 Jan 2020

1. In accordance with reference (a), this is formal notification that the scheduled public hearing for the SCANDIES ROSE Marine Board of Investigation (MBI) and other investigative proceeding relative to the case have been delayed. The hearing was originally scheduled to take place from 08-18 September 2020 in Seattle, WA. With the current Federal and State restrictions that have been put in place to help prevent the spread of COVID-19 and to preserve the safety and health of the MBI team and the public, I made the decision to postpone the hearing. The gathering restrictions imposed by federal agencies and States have significantly complicated coordination of a public hearing, inhibited the execution of a hearing truly open to the public, and disallowed Next of Kin to be present. Furthermore, National Transportation Safety Board (NTSB) representatives indicated that they would not be able to physically attend a public hearing should it take place in September 2020. The Next of Kin, Parties in Interest representatives, and NTSB representatives have been notified of my decision.

2. I have directed my team to develop and present alternative plans to carry out a hearing that may include virtual only, a hybrid of virtual and in-person, and an in-person hearing. Taking into account the fishing seasons, to maximize witness availability, and the necessary logistics to plan and coordinate for an in-person hearing, the earliest opportunity will be late February into march of 2021.

3. As a result of the shifts in the timeline to conduct a public hearing, I request the Report of Investigation (ROI) submission deadline be extended to 1 October 2021.

4. In addition, an original member of the investigation team named in reference (a) recently stepped down for reasons unrelated to this investigation. Thus, the SCANDIES ROSE MBI team composition has been modified. The team is now comprised of the following members in the following roles:

- CDR Gregory Callaghan, USCG, Chairman
- CDR Karen Denny, USCG, Member
- LCDR [redacted] USCG, Member
- LT [redacted] USCG, Legal Counsel
- LT [redacted] USCG, Recorder

5. My team will continue to work with Commandant (CG-INV) on funding and/or technical assistance as may be required in coordinating a February 2021 public hearing.

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PACAREA(5)
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Gregory.A.Callaghan@uscg.mil

16372
27 Dec 2021

MEMORANDUM

From: Gregory A. Callaghan, CAPT

To: CG-DCO

Subj: EXTENSION OF FINAL SUBMISSION DATE OF REPORT OF INVESTIGATION CONCERNING THE SINKING OF THE COMMERCIAL FISHING VESSEL (CFV) SCANDIES ROSE (O.N. 602351)

Ref: (a) SCANDIES ROSE MBI Convening Order Memo signed by DCO on 16 Jan 2020
(b) SCANDIES ROSE Delay Memo to DCO dtd 24 July 2021
(c) CG-545 Policy Letter 5-10

1. The SCANDIES ROSE Marine Board of Investigation (MBI) was officially assigned through reference (a) and the Marine Board's composition was amended in reference (b). When CG-INV positively endorsed reference (b), the deadline for the Report of Investigation (ROI) submission was amended to October 1, 2021.

2. Section 5 of reference (c) states that certain marine casualty investigations with complex elements may have valid reasons for exceeding the time requirements. Valid reasons for exceeding the limitations of the time table include waiting on a test or report from an entity external to the investigating unit. In this case, the Marine Board engaged the Coast Guard Research and Development Center (RDC) to conduct a formal ice accretion study. This study, consisting of a series of controlled experiments, was executed over the course of several months in the summer of 2021. However, unforeseen and unpreventable delays at the research facility resulted in a delay in the final delivery of the RDC's Ice Accretion on Crab Pot REACT report.

3. In anticipation of this delay, the Marine Board sought and was granted an extension to the October 1, 2021 deadline to submit the SCANDIES ROSE ROI. The amended final submission date of ROI is December 31, 2021.

#

Copy: CG-5P
CG-INV
CG-LMI
PACAREA(5)
CGD SEVENTEEN (dp)
CGD THIRTEEN (dp)

Table of Contents

Hyperlinks

Throughout this report there will be various references to supporting documents or material related to this investigation in the form of hyperlinks. The hyperlinks are included in Enclosure (2).

The investigation transcripts are also available by using the hyperlinks listed in the Enclosure.

List of Acronyms

ABS	American Bureau of Shipping
ACL	Annual Catch Limit
ACSA	Alternate Compliance Safety Agreement
ADF&G	Alaska Department of Fish and Game
AGL	Above Ground Level
AIS	Automatic Identification System
AK	Alaska
AKST	Alaska Standard Time
ALCP	Alternate Loadline Compliance Program
ALPAT	Alaska Patrol
AMSEA	Alaska Marine Safety Education Association
AOR	Area of Responsibility
ASCP	Alternate Safety Compliance Program
ASTM	American Society for Testing and Material
AWS	American Welding Society
BSAI	Bering Sea/Aleutian Island
CDO	Command Duty Officer
CEMS	Crew Endurance Management System
CFR	Code of Federal Regulations
CFSAC	Commercial Fishing Safety Advisory Committee
CFV	Commercial Fishing Vessel
CG	Coast Guard
CG-60##	CG rotary wing aircraft, with an aircraft identification number used as a call sign
CGAA	Coast Guard Authorization Act
CGC/USCGC	Coast Guard Cutter
CG-CVC	Coast Guard Office of Commercial Vessel Compliance
CG-ENG	Coast Guard Office of Design and Engineering Standards
CG-INV	Coast Guard Office of Investigations and Casualty Analysis
CGMTA	Coast Guard Marine Transportation Act (of 2012)
CG-SAR	Coast Guard Office of Search and Rescue
CO	Commanding Officer
COD	Certificate of Documentation

Coast Guard	Unites States Coast Guard
COG	Course Over Ground
COMDT	Commandant / The office of the Commandant of the Coast Guard
COMDTINST	Commandant Instruction
COMMDET	Communication Detachment
COTP	Captain of the Port
CRREL	Cold Regions Research and Engineering Laboratory
D17	Coast Guard Seventeenth District
DOT	Department of Transportation
DSC	Digital Selective Calling
EPIRB	Emergency Position Indicating Radio Beacon
EO/IR	Electro-optical/Infrared
EOP	Enhanced Oversight Program
F/V	Fishing Vessel
FAST	Fatigue Avoidance Scheduling Tool
FCC	Federal Communications Commission
FOL	Forward Operating Location
FTE	Full Time Equivalent
GMT	Greenwich Mean Time, also called UTC
GPS	Global Positioning System
GT	Gross Tons (Gross Registered Tons)
HC-130	CG fixed wing aircraft
HF	High Frequency
HP	Horsepower
IFQ	Individual Fishing Quota
IMO	International Maritime Organization
ISO	International Organization for Standardization
JBER	Joint Base Elmendorf/Richardson
JRCC	Joint-Rescue Coordination Center
kt(s)	Knot(s)
LKP	Last Known Position
MBI	Marine Board of Investigation
MD	Medical Doctor
MH-##	Coast Guard Helicopter (60 or 65)
MF	Medium Frequency

MHz	Megahertz
MISLE	Marine Information for Safety and Law Enforcement
MMC	Merchant Mariner Credential
MMSI	Maritime Mobile Service Identity
MSC	Coast Guard Marine Safety Center
MSIB	Marine Safety Information Bulletin
NIOSH	National Institute for Occupational Safety & Health
NDT	Non-Destructive Testing
NM	Nautical Mile
NMC	National Maritime Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPRM	Notice of Proposed Rulemaking
NPFVOA	North Pacific Fishing Vessel Owners' Association
NH	New Hampshire
NT	Net Tons
NTSB	National Transportation Safety Board
NWS	National Weather Service
O.N.	Official Number
OCMI	Officer in Charge, Marine Inspection
ODO	Operations Duty Officer
OPC	Ocean Prediction Center
OPS	Operations Officer
OU	Operations Unit
PII	Party-in-Interest
PLB	Personal Locator Beacon
PSDA	Probability of Survival Decision Aid
R21 AK	Rescue 21 Alaska
RDC	Research and Development Center
ROI	Report of Investigation
ROV	Remotely Operated Vehicle
SAR	Search and Rescue
SAROPS	Search and Rescue Optimal Planning System
SARSAT	Search and Rescue Satellite-Aided Tracking
SMC	Search and Rescue Mission Coordinator

SMI	Serious Marine Incident
SOG	Speed Over Ground
SOLAS	Safety of Life at Sea
SRR	Search and Rescue Region
SRU	Search and Rescue Unit
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
THC	Tetrahydrocannabinol, Marijuana
UMIB	Urgent Marine Information Broadcast
U.S.	United States
USC	United States Code
USCG or CG	United States Coast Guard
UTC	Coordinated Universal Time
VHF	Very High Frequency
VoIP	Voice over Internet Protocol
WA	Washington

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16732
December 30, 2021

**COMMERCIAL FISHING VESSING SCANDIES ROSE (O.N. 602351)
SINKING AND LOSS OF THE VESSEL
WITH FIVE CREWMEMBERS MISSING AND PRESUMED DECEASED
SOUTH OF SUTWIK ISLAND, ALASKA
ON DECEMBER 31, 2019**

EXECUTIVE SUMMARY

The loss of the commercial fishing vessel SCANDIES ROSE, along with five crewmembers, follows the sinking and loss of the commercial fishing vessels LADY OF GRACE and her crew in Nantucket Sound, Atlantic Ocean in 2007 and the DESTINATION with all of its crew, which occurred in February 2017, in Alaskan waters. These vessels suffered catastrophic capsizing due to compromise of the vessel's positive stability characteristics after encountering known and dangerous heavy freezing spray leading to an accumulation of ice high on the vessel.

On December 30, 2019, at approximately 8:35 p.m. (AKST), the fishing vessel SCANDIES ROSE and its seven-person crew departed from Kodiak, Alaska, headed to the Bering Sea to engage in commercial fishing operations in the cod and opilio crab fisheries. The vessel was loaded with fuel, approximately 195 combination cod/crab pots, and 15,000 pounds of bait stowed forward. The planned voyage track took the SCANDIES ROSE and her crew along the south side of the Alaska Peninsula, an area known for fierce and intensely frigid winds blowing out of the numerous inlets and coves to the north of the vessel's course line as it transited from the Shelikof Strait toward False Pass and into the Bering Sea. The Captain and crew were aware of weather forecasts from the National Weather Service along their transit, including warnings of heavy freezing spray and gale force winds. The Captain departed on the accident voyage and later failed to seek shelter along the route despite the weather forecast, vessel icing, and reports from other fishing vessel captains who took shelter from the weather.

Between 6 a.m. and 8 a.m. on December 31, 2019, the watch reported the beginning signs of ice accumulation on the interior webbing of the crab pots and on the exterior forward parts of the vessel. The vessel maintained course and an average speed of 6.5 kts in gradually worsening weather along the planned voyage track, with no indications of any attempt to reduce the accumulation of ice by changing course and speed or by manual ice removal. At approximately 7:15 p.m. on December 31, the deckhand, a survivor, woke up the Captain for the Captain's six-hour watch. At the time, the two discussed the worsening weather, the ice accumulation on the vessel and gear, and the reported starboard list of the vessel. The SCANDIES ROSE Captain made a series of cell phone calls to people and vessels and his tone of voice on the cell phone calls gradually began to reflect the worsening situation onboard the SCANDIES ROSE. In one of the final calls to the fishing vessel PACIFIC SOUNDER, the Captain indicated that he was experiencing a 20-degree list to starboard, winds of 60-70 kts from the west, wind temperature of 12^{o} Fahrenheit and communicated that it was too dangerous to send the crew out to break off the

accumulated ice. The Captain had decided to head for the protected lee of Sutwik Island located approximately 2.5 nautical miles (NM) to the north of his position.

At 9:45 p.m., the Automatic Identification System (AIS) signal of the SCANDIES ROSE indicated that the vessel had turned approximately 50 degrees to starboard, to a northwesterly heading to head to the shelter of Sutwik Island. In a final conversation with the Captain of the PACIFIC SOUNDER, the Captain indicated that the "list had gotten a lot worse" and the stress in the Captain's voice was evident to the listener. At approximately 9:50 p.m., the Captain of the SCANDIES ROSE called the U.S. Coast Guard via marine radio with a "Mayday" message and stated "we are rolling over." The Captain was able to accurately read out the vessel's geographic position before communication was lost.

Two of the seven-person crew managed to don survival suits, abandon the capsizing vessel, and swim to one of two eight-person liferafts which had deployed automatically. The two survivors were rescued approximately four hours later by a Coast Guard helicopter and suffered mild hypothermia. Coast Guard search activities included multiple MH-60 helicopters, two HC-130 fixed wing aircraft, and a large Coast Guard Cutter. The Coast Guard suspended search operations at 6:08 p.m. on January 1, 2020. The other five crew are missing and presumed deceased.

The Coast Guard MBI determined that the initiating event occurred at 11:30 a.m. on December 31, 2019, when the SCANDIES ROSE maintained course and speed on the voyage track with weather forecasted to continue to deteriorate with heavy freezing spray and gale-force storm warnings. In conversation with the captain of the fishing vessel AMATULI, Captain [redacted] reported the formation of ice on the vessel the morning of the accident day, but did not take actions to reduce icing formation or take early and timely advantage of available safe and protected anchorages along the intended voyage track.

Subsequent events include the vessel's reduction in and eventual loss of stability. This loss of stability was exacerbated as the vessel developed a dangerous list to starboard after the 50-degree turn to starboard towards Sutwik Island. Subsequent events then included a loss of maneuverability, capsizing, flooding, and the vessel's sinking. Additional subsequent events included the loss of five of the vessel's crew and two surviving crewmembers entering the water, before making it to a liferaft with eventual rescue.

The primary causal factors that directly contributed to the casualty include: 1) failure to take timely action to prevent excessive ice accumulation despite forecasted and anticipated heavy freezing spray conditions, 2) the vessel's unsafe stability conditions due to the inaccurate stability instructions provided by the Naval Architect who performed the stability assessment and created the stability instructions in 2019, 3) carrying nearly the maximum number of crab pots permitted in the 2019 stability instructions despite commencing a voyage where gale force weather and heavy freezing spray were forecasted, 4) excessive ice weight accumulations from freezing spray, and 5) lack of effective stability regulations that do not realistically account for the dangerous effects of icing and the asymmetrical nature of icing that endanger commercial fishing vessels operating in regions similar to this accident environment.

Other causal factors include the Captain's decisions to: 1) not take timely action to prevent or mitigate excessive ice accumulations from the forecasted and anticipated heavy freezing spray conditions, 2) not create a means for the crew to safely move forward to observe and clear the accumulation of ice on the vessel, and 3) not attend stability training classes that were available. Also contributing to the casualty was the owner's selection of the "qualified individual" who

failed to accurately examine the vessel, perform stability tests and the calculations necessary to properly document the stability condition for the SCANDIES ROSE and then create detailed and accurate stability instructions for the Captain. Accordingly, the owners failed to provide captains for the SCANDIES ROSE with accurate and detailed information to maintain the vessel in a satisfactory stability condition.

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16732
December 30, 2021

**COMMERCIAL FISHING VESSEL SCANDIES ROSE (O.N. 602351)
SINKING AND LOSS OF THE VESSEL
WITH FIVE CREWMEMBERS MISSING AND PRESUMED DECEASED
SOUTH OF SUTWIK ISLAND, ALASKA
ON DECEMBER 31, 2019**

MARINE BOARD'S REPORT

1. Preliminary Statement

1.1. This marine casualty investigation was conducted and this report was submitted in accordance with Title 46, Code of Federal Regulations (CFR), Subpart 4.09, and under the authority of Title 46, United States Code (USC), Chapter 63. Under Title 46 USC §6308, no part of a report of a marine casualty investigation, including findings of fact, opinions, recommendations, deliberations, or conclusions, shall be admissible as evidence or subject to discovery in any civil or administrative proceedings, other than an administrative proceeding initiated by the United States.

1.2. On January 16, 2020, the Deputy Commandant for Operations (DCO) issued the enclosed convening order directing a Marine Board of Investigation (MBI) to thoroughly investigate the December 31, 2019 sinking of the Commercial Fishing Vessel (CFV) or F/V SCANDIES ROSE in which two crewmembers survived and the remaining five crewmembers remain missing and are presumed deceased.

1.3. The following personnel participated in the Marine Board of Investigation: Chairman – CAPT Gregory A. Callaghan, District 11 (D11) Chief, Prevention Division; Member – CDR Karen Denny, D11 Chief, Inspections and Investigations Branch; Member – LCDR [redacted], Chief, Inspections Division, Sector Maryland/National Capitol Region; Recorder – LCDR [redacted], Director of Intelligence Support, Maritime Intelligence Fusion Center Pacific; Legal Advisor – LCDR [redacted], Coast Guard Investigations National Center of Expertise; Technical Advisor – Mr. [redacted], Search and Rescue Program Manager, District 13 (D13) Response; and Technical Advisor – Mr. [redacted], Coast Guard Investigations National Center of Expertise.

1.4. On January 8, 2020, the Chairman designated the vessel's owner, Scandies Rose Fishing Company LLC, and managing owner, Captain [redacted] as a Party-In-Interest (PII) represented by the law office of Holmes, Weddle & [redacted]

1.5. On July 1, 2020, the Chairman designated Mr. [redacted] and Mr. [redacted] the two surviving crewmembers of the SCANDIES ROSE, as PIIs represented by the law office of Stacey & Jacobsen, PLLC.

1.6. On February 24, 2021, the Chairman designated Mr. [redacted] P.E., the Naval Architect who produced the SCANDIES ROSE's 2019 stability instructions, as a PII.

1.7. The Marine Board conducted a formal, recorded interview session on September 23, 2020, to hear testimony from one witness. The Marine Board held a public hearing session at the Edmonds Center for the Arts in Edmonds, Washington (WA) from February 22 through March 5, 2021. A total of 43 witnesses testified in the hearing over a period of 10 days. Due to the COVID-19 pandemic and associated state and federal gathering restrictions, witnesses appeared in person, through virtual testimony using Zoom, or telephonically, as requested, and PII representatives participated throughout the hearing. Witnesses and PIIs cooperated with all investigation requests.

1.8. The Coast Guard was the lead federal agency for initial evidence collection activities and led all efforts to recover additional evidence. The National Transportation Safety Board (NTSB) participated in the fact-finding portion of this investigation.

1.9. References to time in this report are listed as 12-hour and with an a.m. or p.m. to denote morning or afternoon times. All times reflect Alaska Standard Time (AKST), which is Coordinated Universal Time (UTC)/Greenwich Mean Time (GMT), offset of minus 9 hours.

1.10. Throughout the investigation, the Marine Board obtained helpful information from the public using the email addresses: uscg.scandiesrosembi@gmail.com and scandiesrosembi@uscg.mil.

2. Vessel Involved in the Incident

Figure 1 – Photograph of the F/V SCANDIES ROSE in Kodiak, AK, prior to the accident. Unknown date. (Source [redacted]

Official Name:	SCANDIES ROSE
Identification Number/ Official Number (O.N.):	602351
Flag:	United States (U.S.)
Vessel Class/Type/Sub-Type	Fishing Vessel/General Fishery, Coastwise
Build Year:	1978
Gross Tonnage:	195 GT
Length:	116.6 ft
Beam/Width:	34.0 ft [Certificate of Documentation]
Draft/Depth:	11.3 ft
Hull Construction:	Steel
Main/Primary Propulsion: (Configuration/System Type, Ahead Horsepower (HP))	Diesel Reduction, 2 Detroit Diesel 12V2000-R1227K22, 805 HP (600 kW)/1800 RPM
Owner/Managing Owner:	Scandies Rose Fishing Company LLC
Operator:	[redacted]

3. Deceased and/or Missing Persons

Name (First, MI, Last)	Sex	Relationship to Vessel	Age[1]	Status
[redacted]	Male	Captain	[redacted]	Deceased
[redacted]	Male	Engineer/ Deckhand	[redacted]	Deceased
[redacted]	Male	Deckhand	[redacted]	Deceased
[redacted]	Male	Deck Boss	[redacted]	Deceased
[redacted]	Male	Deckhand/ Cook	[redacted]	Deceased

4. Findings of Fact

4.1. The Accident Voyage

4.1.1. On or about December 27, 2019, five members of the crew arrived in Kodiak, AK by plane and boarded the SCANDIES ROSE. Those crewmembers were Mr. [redacted] Mr. [redacted] Mr. [redacted] Mr. [redacted] and Mr. [redacted] Mr. [redacted] who was already on the island, picked them up at the airport and took them to the vessel. While the crew was waiting for the Captain's arrival, they did general clean-up of the vessel.

4.1.1.1. Part of the clean-up process included consolidating and stacking some steel plate that was scattered on deck.

[1] At time of accident.

4.1.1.2. It is believed that the scrap steel stacked by the crew was the metal which had been cut out as a result of a recent repair made to the SCANDIES ROSE's starboard forward waste chute by Highmark Marine. This wasted steel was dumped overboard by the vessel's crew.

4.1.2. Later that same day, Captain [redacted] landed in Kodiak, AK and then boarded the SCANDIES ROSE. Captain [redacted] and Captain [redacted] part owner of Scandies Rose Fishing Company LLC and captain of the fishing vessel (F/V) AMATULI, were on the same flight into Kodiak, AK. Upon arrival, they went their separate ways to prepare their respective vessels for departure.

4.1.3. On December 27, 2019, the SCANDIES ROSE was moved to the Trident Dock to load gear and rig pots. Before the vessel could shift locations, the crew worked three to four hours to free mooring lines that froze on the mooring devices on the vessel during the time the SCANDIES ROSE was laid up between fishing seasons. A deckhand, Mr [redacted] described this evolution and that it took some time "...putting water on the lines, beating it with...ice hammers trying to get the, the boat cut loose. So that was quite an extensive task."[2]

4.1.4. The vessel docked at a Trident Seafoods dock at approximately 1:48 p.m. on December 27, 2019, and stayed in this location until December 30, 2019.

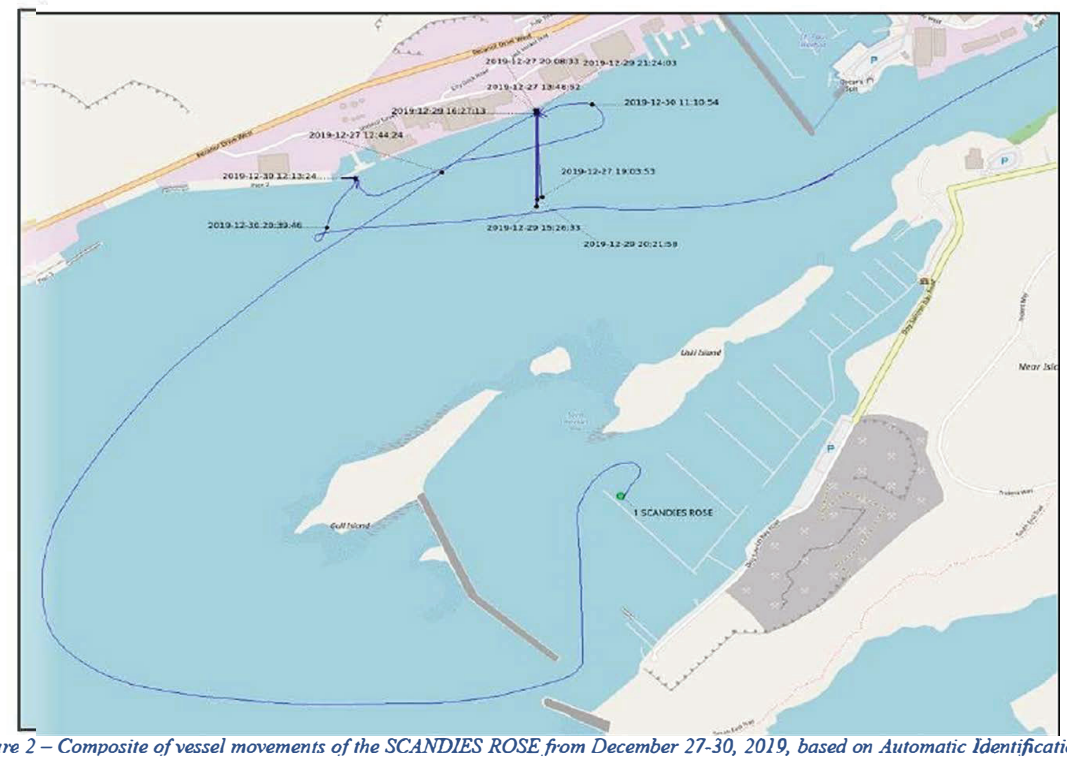


Figure 2 – Composite of vessel movements of the SCANDIES ROSE from December 27-30, 2019, based on Automatic Identification System (AIS) transmissions to land based AIS base station antennas. The solid line is the track of the SCANDIES ROSE and includes a composite of the vessel's movements in Kodiak Harbor from the time it docks at the dock in the vicinity of Ocean Beauty Seafood to when it shifted to the North Pacific Fuel dock and then to its departure of the harbor. Times are in AK Standard Time. (Source Marine Exchange of Alaska)

[2] Mr. [redacted] MBI Hearing testimony, Pg. 535

4.1.5. During the time the vessel was readying for departure, Mr. [redacted] determined that he did not want to sail on the SCANDIES ROSE for the scheduled trip due to his lack of cold weather fishing experience and tendered his resignation to the Captain.

4.1.5.1. Mr. [redacted] had previously sailed as a deckhand/bait man on the SCANDIES ROSE for one season starting on the vessel on September 10, 2019, but had not fished pot cod and king crab before.[3]

4.1.5.2. Mr. [redacted] resigned on December 27, 2019, and had his gear off the vessel that same day.

4.1.6. The Captain needed a replacement for the Mr. [redacted] and Mr. [redacted] suggested a friend, Mr. [redacted] an experienced fisherman. Mr. [redacted] was contacted on December 28, 2019, by Mr. [redacted] who stated that the SCANDIES ROSE needed an experienced deckhand. Initially, the Captain wanted the newly hired deckhand to fly to Kodiak the same day, but Mr. [redacted] needed time to get his affairs in order. In the early afternoon on December 29, 2019, Mr. [redacted] arrived in Kodiak and then reported to the vessel.

4.1.7. The SCANDIES ROSE crew complement now included two new crewmembers, Mr. [redacted] and Mr. [redacted] who had no previous experience sailing on the SCANDIES ROSE. They did, however, have prior experience on commercial fishing vessels operating in Alaskan waters and the Bering Sea.

4.1.8. The crew configured, loaded, and secured between 192 and 198[4] crab pots, sized 7 ft x 8 ft x 34 in, onto the vessel's deck. The pot configuration was secured on deck in a manner that did not provide an alleyway along the sides or down the middle of the deck for the crew to get from the house forward to the bow. The pot configuration onboard the SCANDIES ROSE required the crew to climb over the top of the pots to get anywhere forward of the super structure including the forward deck area. Additionally, the crew loaded bait required for pot cod fishing in the freezers located forward on the vessel.

4.1.9. On December 30, 2019, the crew continued preparing the vessel for sea by chaining down the pot stacks, dogging hatches, and testing bilge alarms.[5] The SCANDIES ROSE got underway and shifted to a fuel dock where the vessel took on diesel fuel for the main engines and generators, as well as potable water.

4.1.10. In compliance with the company practices at the beginning of each season, the crew filled out contracts, medical questionnaires, and other company related documents. These documents were sent electronically ashore to the vessel manager after the vessel sailed.

4.1.11. Captain [redacted] who was the vessel's certified drill instructor, conducted the required training and drills with the crew. The drills included discussions about the engine room fire suppression system, locations of liferafts onboard, and the vessel's Emergency

[3] Mr. [redacted] MBI Hearing testimony, Pg. 711
[4] The number of crab pots varied based on witness testimony between 192 and 198. One witness, Captain [redacted] who spoke to the Captain right before the accident stating that the Captain said he had 195 pots aboard.
[5] Mr. [redacted] CG Exhibit 132, Pre-Hearing Transcript, Pg. 145

Position Indicating Radio Beacon (EPIRB). The vessel's crew was instructed on how to make a "mayday" call using the vessel's radios. The newest crewmember, Mr. [redacted] was directed to don an immersion suit while other crewmembers observed him putting the suit on. The rest of the crew did not don immersion suits during this drill.

4.1.12. The EPIRB was taken into the wheelhouse as part of the training. The crew talked about the use of the EPIRB, but Mr. [redacted] stated that the operation of the beacon was not demonstrated because the Captain feared possibly sending a false alert signal.

> *...we did bring the EPIRB into the wheelhouse, and this is a thing I do remember which is* [redacted] *hit the button on it, and he -- I remember, he's like, whoops, I shouldn't have done that, because I'll call you guys* [the Coast Guard] *on accident. But I never saw the lights flash on when it happened. We were in a dark wheelhouse.*[6]

4.1.13. The SCANDIES ROSE's departure on December 30, 2019, was delayed by approximately six hours to wait on a favorable tide so the vessel could transit through Whale Pass for the early part of the voyage. Transiting through Whale Pass would provide the vessel shelter from the weather for the first part of the voyage.[7]

4.1.14. In addition to conducting the required safety drills, Captain [redacted] and the crew discussed the forecasted weather for their proposed route to the fishing grounds. In testimony, Mr. [redacted] spoke about the forecast:

> *Q. ... so you referenced the forecast you heard on the radio. And, and what kind of forecast were you hearing at that time?*
> *A. I, I couldn't quote it verbatim, but it was enough of a shitty forecast to -- I didn't think we were going to leave that night.*[8]

4.1.15. The following figures show the National Weather Service (NWS) weather forecast zones for the Shelikof Strait and the area south of the Alaska Peninsula, Sitkinak, to Castle Cape.

[6] Mr. [redacted] MBI Hearing Transcript, Pg. 553
[7] Mr. [redacted] MBI Hearing transcript, Pg. 549
[8] Mr. [redacted] MBI Hearing transcript, Pg. 160

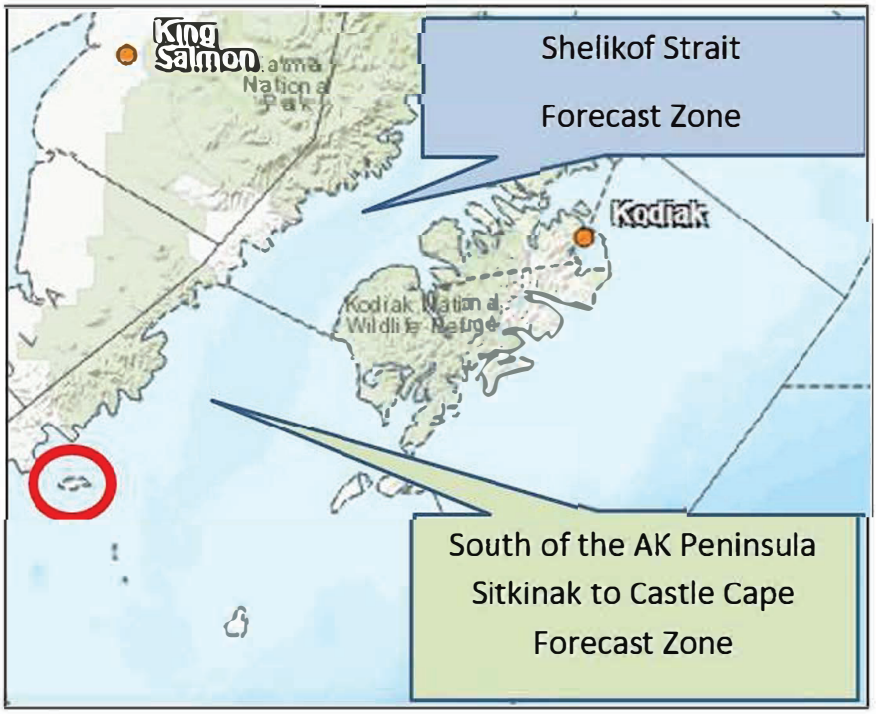


Figure 3 – Areas that the SCANDIES ROSE traveled in the Shelikof Strait and later in the area south of the Alaska Peninsula where the National Weather Service provides weather forecasts to mariners. SCANDIES ROSE accident site circled in red. (Source Coast Guard)

PKZ138-311345-

Shelikof Strait –

329 PM AKST Mon Dec 30 2019

...GALE WARNING TUESDAY NIGHT...

.TONIGHT...S wind 25 kt. Seas 5 ft. Rain.
.TUE...S wind 15 kt becoming SW 25 kt in the afternoon. Seas 3 ft building to 6 ft in the afternoon.
.TUE NIGHT...W wind 35 kt. Seas 9 ft. Freezing spray.
.WED... W wind 30 kt. Seas 8 ft.
.WED NIGHT...W wind 25 kt. Seas 4 ft.
.THU...NW wind 20 kt. Seas 5 ft.
.FRI THROUGH SAT...NW wind 25 kt. Seas 6 ft.

Figure 4 – Weather forecast issued at 3 29 p.m. on December 30, 2019 for the area in the vicinity of Shelikof Strait. (Source NWS)

4.1.16. On Monday, December 30, 2019, between 8:35 p.m. and 8:41 p.m., the SCANDIES ROSE departed the North Pacific Fuel dock, Kodiak, AK. Captain [redacted] was at the helm as the vessel headed to sea on a route that would ultimately take the vessel up into and then through the Shelikof Strait and then generally to the west/southwest down the south side of the Alaska Peninsula.

HYPERLINK: Enclosure (2) contains hyperlink (1) which is a video based voyage animation for the SCANDIES ROSE voyage based on its AIS data with certain significant points of the voyage highlighted.

4.1.17. The vessel sailed northeast out the harbor channel, under the Near Island Bridge, and turned to the northwest about an hour later, navigating through Narrow Strait. The vessel continued in a westerly direction through Whale Pass averaging 9-10 knots (kts) speed over ground (SOG).

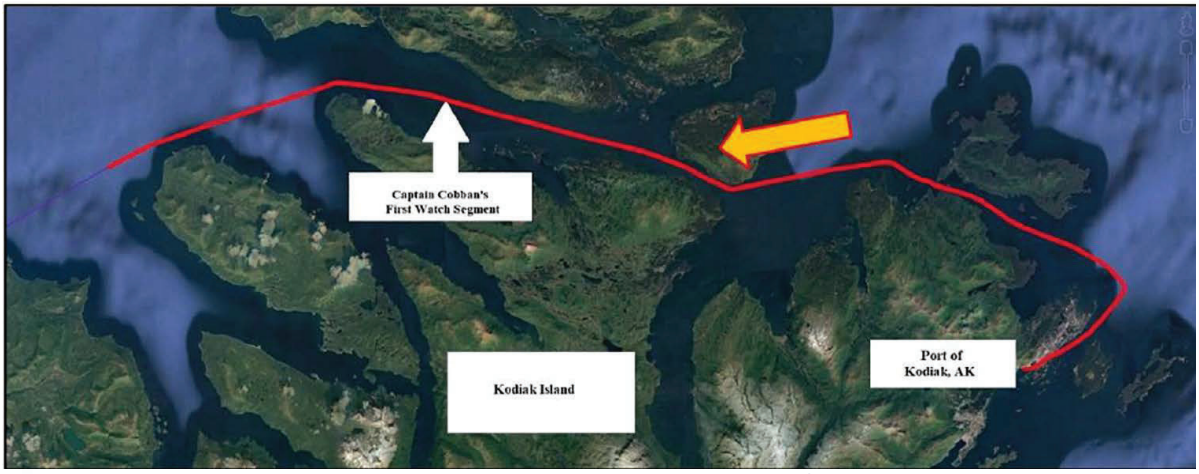


Figure 5 – Image showing the track, indicated in red, of the SCANDIES ROSE after the vessel departed Kodiak at approximately 8 35 p.m. on December 30, 2019. During this part of the transit, the Captain was reportedly on the navigation watch. (Source Coast Guard)

4.1.18. While underway during the transit to the fishing grounds, Captain [redacted] and the six crewmembers stood a navigation watch. On the accident voyage, the Captain created a watch rotation that had him operating the vessel for a period of six hours and then each of the other six crewmembers standing a 1-hour navigation watch. After 12 hours, the rotation would repeat. The figure below illustrates the approximate times that the crew stood watch throughout the accident voyage.

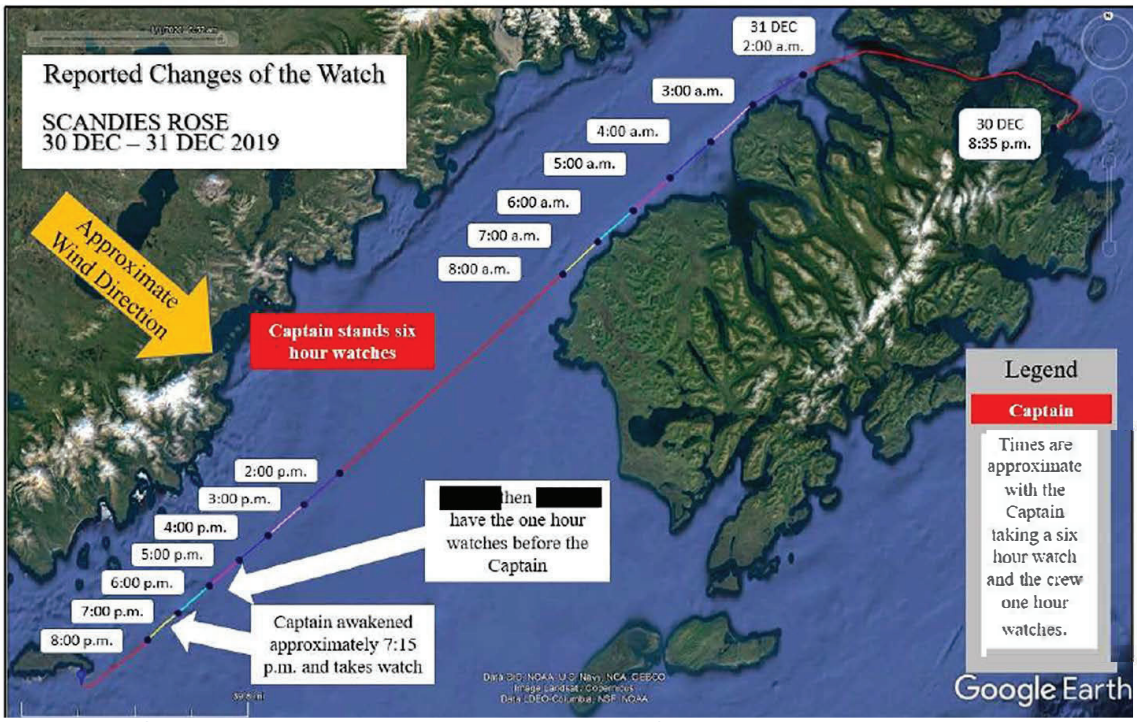
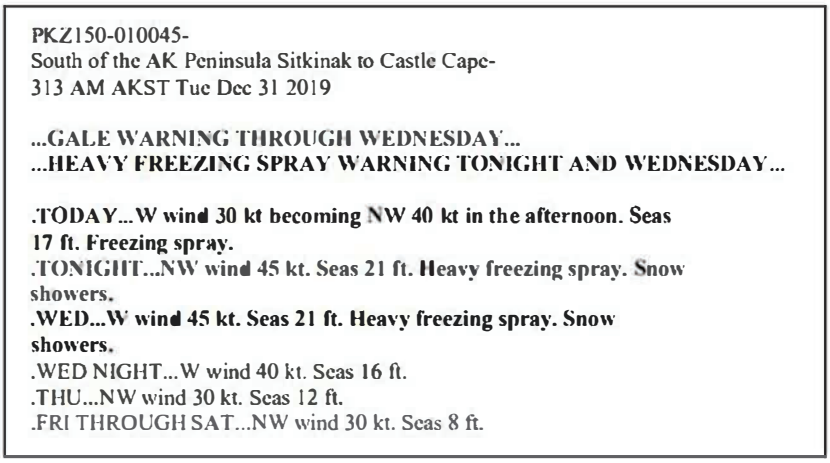


Figure 6 – Track line of the SCANDIES ROSE with segments of the course colored to indicate the navigational watch schedule as described in witness testimony. The yellow arrow shows the approximate wind direction. (Source Coast Guard)

4.1.19. At approximately 2:00 a.m. on December 31, 2019, the SCANDIES ROSE exited the Kupreanof Strait and entered the Shelikof Strait, between the south side of the Alaska Peninsula and the west coast of Kodiak Island. The vessel turned to port and steadied on a southwesterly course that followed the Kodiak Island coastline.[9]



PKZ150-010045-
South of the AK Peninsula Sitkinak to Castle Cape-
313 AM AKST Tue Dec 31 2019

...GALE WARNING THROUGH WEDNESDAY...
...HEAVY FREEZING SPRAY WARNING TONIGHT AND WEDNESDAY...

.TODAY...W wind 30 kt becoming NW 40 kt in the afternoon. Seas 17 ft. Freezing spray.
.TONIGHT...NW wind 45 kt. Seas 21 ft. Heavy freezing spray. Snow showers.
.WED...W wind 45 kt. Seas 21 ft. Heavy freezing spray. Snow showers.
.WED NIGHT...W wind 40 kt. Seas 16 ft.
.THU...NW wind 30 kt. Seas 12 ft.
.FRI THROUGH SAT...NW wind 30 kt. Seas 8 ft.

Figure 7 – NWS forecast for the period issued at 3 13 a.m. on December 31, 2019, including the vicinity of Sutwik Island. (Source NWS)

4.1.20. On December 31, 2019, between 2:00 a.m. and 8:00 a.m., the crew of the SCANDIES ROSE rotated through their hourly bridge watches. As part of the vessel routine, at the end of each watch, the off-going crewmember was to complete a round of the engine room to ensure the vessel's engines and auxiliary equipment were in good working order. A surviving crewmember stated the vessel had little ice buildup during his watch periods, and the amount of observed accumulated ice on the vessel was not enough to be a concern.[10]

4.1.21. Captain [redacted] assumed the watch from Mr. [redacted] the morning of December 31, 2019. The vessel continued on a course of approximately 240 degrees at a steady speed of 8 kts.[11]

4.1.22. Cell phone records indicate that at 11:18 a.m., the Captain called the AMATULI using the satellite phone onboard the SCANDIES ROSE. The Captain of the AMATULI, Captain [redacted] was the majority owner of the SCANDIES ROSE. Captain [redacted] spoke to Captain [redacted] for approximately 12 minutes.

4.1.22.1. The AMATULI departed Kodiak on December 28, 2019. This was done so the vessel could be in Dutch Harbor, AK by January 1, 2020, which was a stipulation in the AMATULI's contract for cod tendering operations.

[9] The proposed voyage plan would have had the SCANDIES ROSE sailing southwest along the Alaska Peninsula, then navigating through False Pass in order to enter the Bering Sea.
[10] Mr. [redacted] MBI Hearing Transcript, Pg. 558
[11] CG Exhibit 020, the survivors' work/rest history forms slightly contradict testimony as to times of watch rotation.

4.1.22.2. During this conversation, Captain [redacted] told Captain [redacted] that he (and the AMATULI) had to pull into Unimak Bight that night to get out of the weather. He testified:

> *I asked him how it was going. And he said it was a shitty ride, which was a shitty ride for me, 150 miles farther down the pike. So, I didn't doubt that. He said it was very cold and he was making light icing at that time. And I said, well, I had to pull into Unimak Bight* [sic][12] *to just rest the crew because I wasn't going to go through Unimak Pass when I was tired and the weather was so foul. And I said, you know, just you go ahead and do that if you need to. It's not -- there's no hurry here. Just get, be safe.*[13]

4.1.23. At approximately 2:00 p.m., Captain [redacted] was relieved of the navigation watch. The SCANDIES ROSE was maintaining a southwesterly course and a SOG of 9-10 kts.

4.1.24. Between 2:00 p.m. and 8:00 p.m., the vessel's heading remained steady on a southwesterly course and the average speed decreased to 6.5 kts. Based on Automatic Identification System (AIS)[14] data, from 6:20 p.m. and until 7:20 p.m., the course track which had previously been relatively steady, began to yaw to the right or left in a manner which had not been observed earlier or later during the transit. During this time, the weather conditions deteriorated with increased wind and growing seas.

PKZ150-011300-
South of the AK Peninsula Sitkinak to Castle Cape-
252 PM AKST Tue Dec 31 2019

...GALE WARNING THROUGH WEDNESDAY NIGHT...
...HEAVY FREEZING SPRAY WARNING THROUGH WEDNESDAY NIGHT...

.TONIGHT...NW wind 45 kt. Seas 21 ft. Heavy freezing spray. Widespread snow showers.
.WED...NW wind 45 kt. Seas 20 ft. Heavy freezing spray. Widespread snow showers.
.WED NIGHT...W wind 40 kt diminishing to 30 kt after midnight. Seas 15 ft subsiding to 9 ft after midnight. Heavy freezing spray.
.THU...W wind 25 kt. Seas 9 ft.
.THU NIGHT...NW wind 30 kt. Seas 9 ft.
.FRI...NW wind 35 kt. Seas 8 ft.
.SAT...NW wind 30 kt. Seas 8 ft.
.SUN...N wind 25 kt. Seas 8 ft.

Figure 8 – NWS forecast for the period, issued at 2 52 p.m. on December 31, 2019 for the area in the vicinity of Sutwik Island where the SCANDIES ROSE would attempt to seek shelter. (Source NWS)

[12] Minor grammatical corrections have been made where appropriate throughout this document in the quoted text that is used from various interview transcripts.
[13] Captain [redacted] CG Exhibit 132, Pre-hearing Transcript, Pgs. 61-62
[14] AIS, a vessel tracking system to enhance the safety of navigation.

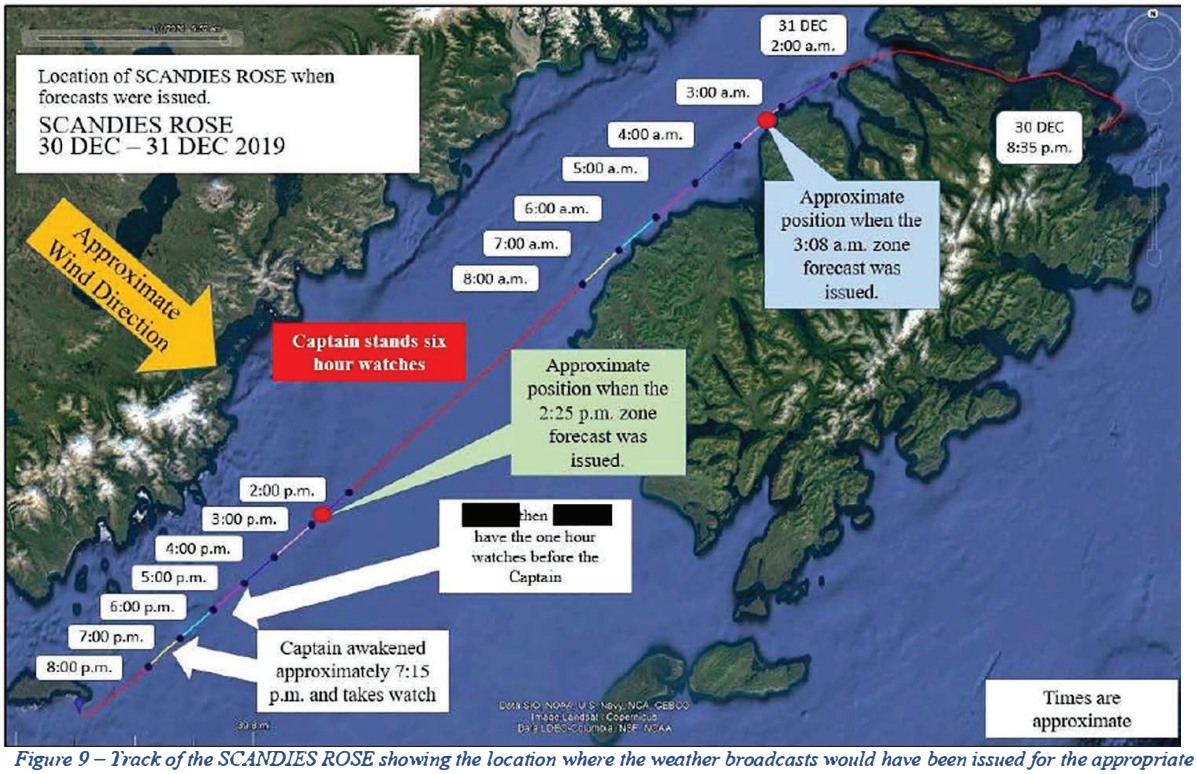


Figure 9 – Track of the SCANDIES ROSE showing the location where the weather broadcasts would have been issued for the appropriate location or zone. As noted, watch times are approximate and forecast issue times are accurate. (Source Coast Guard)

4.1.25. At approximately 5:00 p.m., Mr. [redacted] took over the navigation watch. He was relieved at approximately 6:00 p.m. by Mr. [redacted]

4.1.26. At approximately 7:15 p.m., Mr. [redacted] called Captain [redacted] to wake him up for watch. Minutes later, Captain [redacted] came up to the bridge and the two discussed the worsening weather, the ice accumulation on the pot stack and vessel's superstructure, and the development of an estimated 2-degree list to starboard. In testimony, a surviving crewmember recalled

> *Everything was fine until about -- I was on, I was on watch until about 7:15 on the 31st. 7:15, I woke up [redacted] for his watch. I was the last of our crew to take the watch, and then so I got… [redacted] came up. And I told [redacted] I go, yeah, it looks like we have a little bit of a list. But it wasn't nothing—it wasn't anything too crazy.*[15]

4.1.27. When asked to describe the list, the crewmember stated it was one to two degrees to starboard and that the SCANDIES ROSE was continuing to build ice. He continued that Captain [redacted] and he discussed de-icing the vessel.

> *We were like, okay, well, you know, we're going to have to get this off. And I go, well, do you want to go get it off now? And he goes, well, we'll just wait till we get into shelter … and I didn't have any, I didn't have any qualms at the time of that.*[16]

[15] Mr. [redacted] CG Exhibit 132, Pre-hearing transcript, Pg. 146
[16] Mr. [redacted] CG Exhibit 132, Pre-hearing transcript, Pg. 147

4.1.28. Based on the testimony of Mr. [redacted] the SCANDIES ROSE was taking seas on the starboard bow with sea spray from the prevailing winds increasing the rate of icing.

> *Well, because the weather came up and, like I said, it was kind of hitting us -- we were bucking into it, and it was quarterly to the bow. So we were making a lot of spray, and the spray was making ice*[17]

4.1.29. During this last watch relief, when the Captain arrived in the wheelhouse, Captain [redacted] and Mr. [redacted] discussed ways to reduce the icing:

> *We're starting to list a little to the starboard side. It was kind of hard to tell if it's the waves. It was rolling around. It's kind of hard to tell. But it felt like we were a little heavier on the starboard side. So I let him know that and asked him if we wanted to slow down, because we were bumping into it, making a lot of spray, making a lot of ice, and he didn't seem concerned with that or changed course.*[18]

4.1.30. Between 7:15 p.m. and 7:30 p.m., after being relieved of the watch and before leaving the bridge, Mr. [redacted] recalled the condition of the vessel in terms of ice accumulation

> *...the windows were all iced, except for the first two that have the heat film, but everything else was iced over. The pots had a good -- I mean, it doesn't look like much, but ice is really heavy. It was probably couple inches when it started.*
> *Q. And is that --*
> *A. -- glazed -- more of them glazed probably back on the pots within the bow head. It had a good little ice build-up.*[19]

4.1.31. After relief, the Captain maintained the SCANDIES ROSE's intended course and speed. After concluding the relief with the Captain, Mr. [redacted] went below and met the vessel's engineer coming out of the engine room. Mr. [redacted] stated that he thought the engineer had been in the engine room transferring fuel to alleviate the starboard list but did not talk to the engineer to confirm.

4.1.32. Mr. [redacted] went into the stateroom he shared with Mr. [redacted] to rest.

4.1.33. After taking the watch and after 8:00 p.m., Captain [redacted] made a series of phone calls using the satellite phone.

4.1.33.1. One phone call was to a friend in North Carolina to wish her Happy New Year. During this phone call, Captain [redacted] told the friend that the vessel was listing, but she

[17] Mr. [redacted] MBI Hearing Transcript, Pg. 1063
[18] Mr. [redacted] MBI Hearing Transcript, Pg. 1063
[19] Mr. [redacted] MBI Hearing Transcript, Pg. 1065

said he did not sound alarmed. A newspaper quote from the friend stated that the Captain said he needed to seek shelter from the weather.[20]

4.1.33.2. At 8:12 p.m.,[21] Captain [redacted] called Captain [redacted] again on the tag phone.[22] The SCANDIES ROSE was continuing on course to the west/southwest about 8 NMs northeast of Sutwik Island. The two Captains discussed the weather conditions the SCANDIES ROSE was experiencing and the list of the vessel. During this call, the AMATULI was about to round Ulakta Head and then head into port in Dutch Harbor, AK. During testimony, Captain [redacted] recalled discussing de-icing options with Captain [redacted]

> *And then finally he came back to me on the, I think it was the 31st, but it was fairly early in the afternoon, or maybe later afternoon but early evening. And I asked him how it was going. And he said that it was a shitty ride, which was a shitty ride for me, 150 miles farther down the pike. So, I didn't doubt that. He said it was very cold and he was making light icing at that time.*[23]

4.1.34. Sometime after 9:00 p.m.,[24] the SCANDIES ROSE was about 5.5 NM due east of Sutwik Island and holding the original course to False Pass. Captain [redacted] called the PACIFIC SOUNDER and spoke to the vessel's captain, a longtime fellow fisherman. At the time of the call, the PACIFIC SOUNDER was in the Bering Sea north of the Aleutian Chain and fishing for cod. The PACIFIC SOUNDER had just set its pots and was jogging into the weather to minimize the effects of the seas and freezing spray while the crew was breaking ice, which had accumulated on the vessel, and securing the vessel for the sea conditions they were encountering. During this conversation, the Captains discussed the following:

4.1.34.1. Captain [redacted] asked him about his knowledge and experience with good anchorage spots around Sutwik Island. Captain [redacted] stated that he wanted to get into the shelter of that land mass.

4.1.34.2. Captain [redacted] told him that the SCANDIES ROSE had accumulated quite a bit of ice and that the vessel had developed about a 20-degree starboard list. Captain [redacted] also stated that due to the weather conditions that included 60-70 kt winds, he did not believe that it was safe to send the crew on deck to break ice.

During testimony, Captain [redacted] recalled discussing de-icing options with Captain [redacted]

> *Yes, he did mention that he thought it wasn't safe for the crew to go out, so they are working themselves to get leeway behind the island before they break ice. And I*

[20] https://www.adn.com/alaska-news/2020/01/02/crab-boat-that-sank-on-new-years-eve-leaving-5-presumed-dead-was-headed-into-area-under-gale-warning/
[21] CG Exhibit 139, SCANDIES ROSE Tag Phone Records
[22] The "tag phone" is a Mitsubishi track/tag satellite phone which was installed on the vessel.
[23] Captain [redacted] CG Exhibit 132, Pre-Hearing Transcript, Pg. 62
[24] Testimony from Captain [redacted] approximates the phone call as between 9:15 and 9:30 p m.

imagine in blowing 60, 70, down there, it would have been pretty nasty, so it probably wouldn't have been safe to bring the boys out to do that at that time.[25]

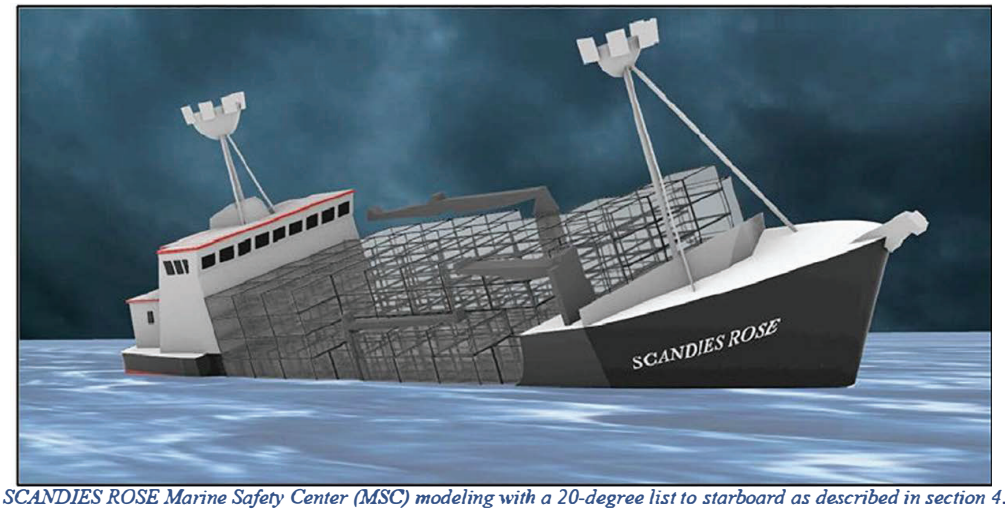


Figure 10 - SCANDIES ROSE Marine Safety Center (MSC) modeling with a 20-degree list to starboard as described in section 4.1.34.2. of the ROI. (Source Coast Guard Marine Safety Center)

4.1.34.3. Captain [redacted] told him that the SCANDIES ROSE had recently received new stability instructions and that he was carrying 195 pots onboard.

4.1.34.4. Captain [redacted] and Captain [redacted] had a casual conversation about the recent holiday season and Captain [redacted] shared that he had recently purchased more shares of the SCANDIES ROSE.

4.1.34.5. When asked about his sense of Captain [redacted] concern at the time of the call, Captain [redacted] recalled:

> *...we also talked about Christmas, and he got stuck in Sitka there over Christmas at the airport. So it was -- he was talking about other things at that point, so I didn't -- it didn't seem like it was that bad.*[26]

4.1.34.6. After approximately 10 minutes, Captain [redacted] ended the conversation, as he had to go to his vessel's engine room and switch a generator over.

4.1.35. Shortly before the SCANIDES ROSE's "mayday" call, Captain [redacted] called the SCANDIES ROSE back after completing his work in the PACIFIC SOUNDER's engine room. Captain [redacted] called the SCANDIES ROSE using his vessel's satellite phone and, in testimony, stated:

[25] Captain [redacted] MBI Hearing Transcript, Pg. 802
[26] Captain [redacted] CG Exhibit 132, Pre-hearing Transcript, Pg. 394

...I believe the time was 2158, he told me at that time the list had gotten a lot worse, and he didn't know how this was going to go. And that's when I lost communications with him at that point.
Q. And did he mention anything else ... when he mentioned that the list had gotten a lot worse, did he give you any estimation?
A. No, he didn't. He didn't from 20 degrees the first time, and there was more distress in his voice when he told me that. I mean those last few sentences there, he had some concern there. So he didn't mention how, how much worse the list had gotten, but he said the list had got worse, and he didn't know how this was going to go. And then I lost communication with him.[27]

4.1.35.1. Captain [redacted] indicated that he had known Captain [redacted] for approximately nine years and never heard that level of stress in Captain [redacted] voice before.

4.1.36. At approximately 9:45 p.m., the SCANDIES ROSE was approximately 2.5 NMs south of Sutwik Island. The vessel turned approximately 50 degrees to starboard towards the shelter of the island, the vessel's speed reduced to about 6 kts, and the vessel held a northwesterly course as indicated in figure 11, below:

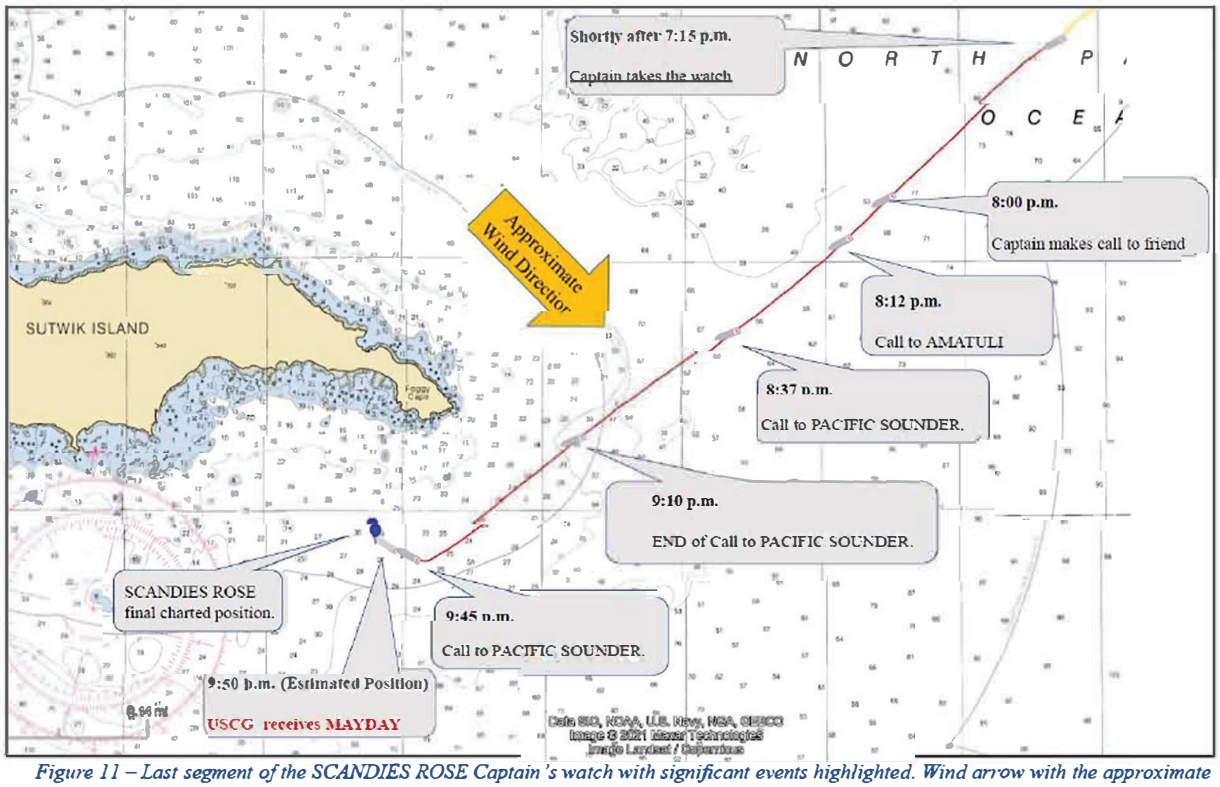


Figure 11 – Last segment of the SCANDIES ROSE Captain's watch with significant events highlighted. Wind arrow with the approximate wind direction has been added. (Source Coast Guard)

4.1.37. At the same time, the two survivors were in their shared stateroom when the vessel suddenly heeled farther to starboard and remained at that angle of list. The precise angle of

[27] Captain [redacted] MBI Hearing Transcript, Pg. 800

heel or list at that time cannot be determined. Mr. [redacted] immediately left the stateroom to head up the one flight of stairs to the wheelhouse.

4.1.38. There is no evidence that the general alarm was activated to alert the crew of any emergency.

4.1.39. There was little time between the extreme heel to starboard and loss of vessel's stability that led to the vessel's sinking. Upon, reaching the wheelhouse, Mr. [redacted] recounted

> *Oh, it was pretty much immediate. I mean, I looked at [redacted] and I -- just that, that -- I don't know how to explain it to anybody. Just that gut wrench that not -- this is not good. Like this is -- there's no coming back from this. Like we are sinking now. And I just kept yelling, just started yelling because there's no alarm going off.*[28]

4.1.40. Shortly after this, other crew made their way into the wheelhouse. Survivors recall seeing some of the other crew but could not confirm if all of the crew made it to the wheelhouse prior to the vessel sinking.

4.1.41. Captain [redacted] was in the starboard area of the wheelhouse where the main control station for the vessel was located.

4.1.42. The survival suits were in a locker in the wheelhouse which was slightly to port of the vessel centerline in the after console. The suits were passed out to the crew.

[28] Mr. [redacted] MBI Hearing Transcript, Pg. 565

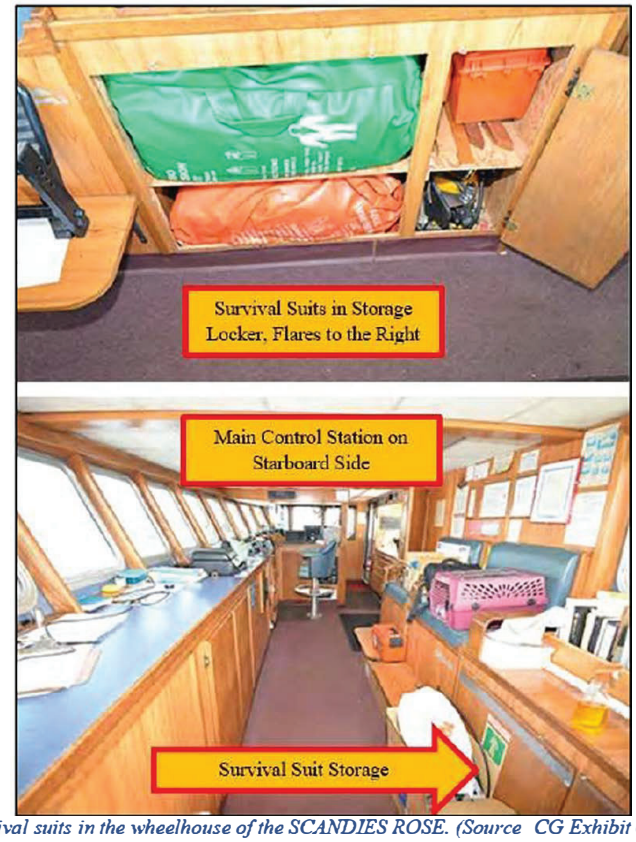


Figure 12 – Location of the survival suits in the wheelhouse of the SCANDIES ROSE. (Source CG Exhibit 004)

4.1.43. The crew began putting on their survival suits as the vessel maintained a heavy list to starboard and, at this time, there was evidence of available electrical power on the vessel.

> *And as I'm getting my suit on, there's people around me. I do remember looking up, and the throttles got pulled back on the boat, and then it just -- it was downhill from there. The boat started going fast. Like fast. After we lost the, you know, forward momentum.*[29]

4.1.44. The two survivors moved to the high side of the wheelhouse, where the port side door to the outside was located and continued putting on the survival suits.

4.1.45. In the wheelhouse, crewmembers were having great difficulty finding secure footing to put on the cumbersome survival suits due to the heeling deck creating lack of a flat space and loss of footholds. One survivor recounted:

> *[redacted] was on the port side right over there by the door, behind that chair, so that was preventing him from sliding down to the starboard side. And then after I jumped into the bench, [redacted] slid down to this chair. So all those guys were down by the chart table trying to get their suits on and their -- trying to -- I don't know, get to -- help [redacted] and see what [redacted] wanted them to do, and they were kind of looking to him for guidance…*[30]

[29] Mr. [redacted] MBI Hearing Transcript, Pg. 567
[30] Mr. [redacted] MBI Hearing Transcript, Pg. 1113

4.1.46. At some point immediately prior to the call to the Coast Guard on the high frequency (HF) radio, Mr. [redacted] recounted that the Captain shifted the vessel's propulsion system from ahead to the out of gear or neutral propulsion position

> *When I first went up there and was talking to* [redacted] *and was like, what was going on, call the Coast Guard, he was like okay, and then he took it out of gear. That's what made the boat start going more -- I think maybe the transitional force maybe. I don't know, but as soon as he took it out of gear, everything kind of sped up a little bit more.*[31]

4.1.47. At 9:50 p.m., Coast Guard Communication Detachment (COMMDET) Kodiak watchstanders received a "mayday" call on 4125 KHz from the SCANDIES ROSE – "mayday, mayday, mayday… SCANDIES ROSE, SCANDIES ROSE, SCANDIES ROSE… (Position given two times) we are rolling over."

4.1.47.1. The Captain included the SCANDIES ROSE's position during this "mayday" call, 56°-29' N, 157°-01' W. In the background, an unidentified person is heard calling out part of vessel's position.

4.1.47.2. An alarm, similar to other warning alarms heard previously, could be heard in the background to the radio transmission as well as other people's voices. It is unknown what that alarm signified.

4.1.47.3. COMMDET Kodiak received the transmission and nearly immediately called back the SCANDIES ROSE to establish communications with the vessel. COMMDET Kodiak watchstanders were unable to make contact with the SCANDIES ROSE.

HYPERLINK: Enclosure (2) contains hyperlink (2) which is an audio recording of the distress call the SCANDIES ROSE transmitted on the night of the accident and the initial Coast Guard response to the mayday transmission.

4.1.48. Mr. [redacted] assisted Mr. [redacted] in closing the long zipper to the survival suit and they exited the wheelhouse through the port side door shown in figure 13.

4.1.49. Mr. [redacted] recalled that while he and Mr. [redacted] were out of the wheelhouse and close to the door on the port side of the vessel, he recalled hearing a faint voice on the marine radio but the transmissions were broken.[32]

4.1.50. The survivors did not see the EPIRB or mention the use or deployment of the EPIRB. The EPIRB was located on that same side just aft of the wheelhouse on the same deck as the wheelhouse.

[31] Mr. [redacted] MBI Hearing Transcript, Pg. 1072
[32] Mr. [redacted] MBI Hearing Transcript, Pg. 36

Figure 13 – Large arrow points to the port side wheelhouse door on the SCANDIES ROSE. The smaller arrow points to the location where the EPIRB was stored in the float free bracket, which is circled in red. (Source CG Exhibit 004, with markup)

4.1.51. Crewmember [redacted] was reported to have successfully donned an immersion suit and made it to the port side door but did not join crewmembers [redacted] and [redacted] outside. Mr. [redacted] location was described as just inside the port wheelhouse door. The survivors recounted:

> *So then me and [redacted] kind of screaming at [redacted] We were just standing around right outside the port door on the right down -- down the stairs along the wall is like where they standing, and we're like, what do we do? We can't get to the … raft because it's up on the roof, and it's, you know, at a super steep angle. The EPIRB is on the other side. You can't get to that. Because I'm thinking – I'm trying to get to these things.*[33]

[33] Mr. [redacted] MBI Hearing Transcript, Pg. 1073

Figure 14 – Composite of photo montage of the SCANDIES ROSE EPIRB. Top left, EPIRB in housing on the inside of top rail aft of the wheelhouse. Top right is the location shown with the yellow arrow in reference to the position in relationship to the port wheelhouse door. Bottom left, the open EPIRB housing during inspection for 2019 Valuation and Condition Survey. Bottom right, the empty housing as seen during underwater site survey conducted by Remotely Operated Vehicle (ROV) in February 2020. (Source – [redacted] photos for 2019 Valuation Survey and bottom right, CG Exhibit 008)

4.1.52. Mr. [redacted] and Mr. [redacted] attempted to locate a line to assist the other crewmembers still inside the wheelhouse. These attempts were unsuccessful as the lines tied to the railings that could have been used in this attempt were "too iced up."[34] Crewmembers [redacted] and [redacted] remained on the port side exterior in the vicinity of the door yelling to the other crewmembers to exit the wheelhouse.

4.1.53. The SCANDIES ROSE continued to roll to starboard and the two crewmembers attempted to stay close to one another. Crewmembers [redacted] and [redacted] agreed that their plan was to stay on the SCANDIES ROSE as long as they could and then try to stay together if or when they had to enter the water. The lights of the SCANDIES ROSE went out.

4.1.54. The last AIS transmission from the vessel was received at 9:51:52 p.m. AKST by a satellite designed to track AIS on vessels. Without power, or having sunk, the SCANDIES ROSE AIS would no longer transmit a signal.

[34] Mr. [redacted] MBI Hearing Transcript, Pg. 1074

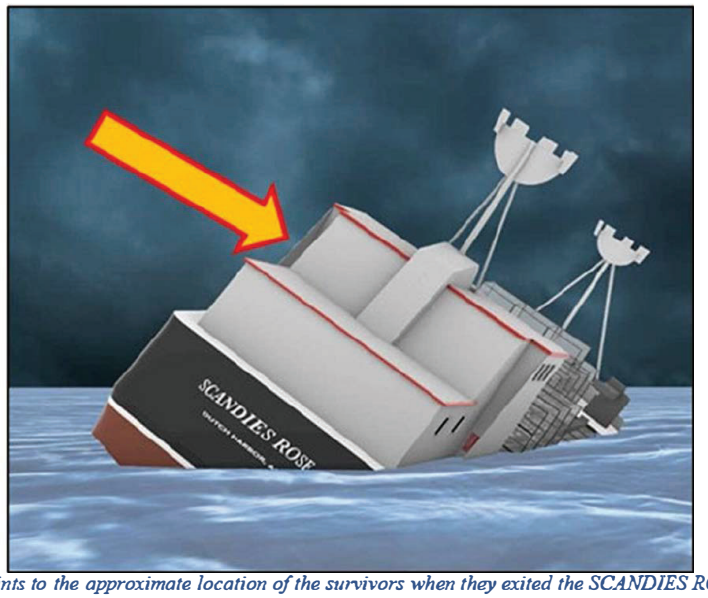


Figure 15 – Yellow arrow points to the approximate location of the survivors when they exited the SCANDIES ROSE wheelhouse port side door. They later moved forward as the vessel began to sink and a wave washed them overboard. The MSC model is displaying an approximate list to starboard of 35 degrees. (Source Coast Guard)

4.1.55. At some point, Mr. [redacted] and Mr. [redacted] entered the water after being washed off the sinking vessel by a wave. Initially, the two survivors were separated after entering the water. The observed conditions included "30-foot seas" and "icy conditions."[35]

4.1.56. After orienting themselves in the water, the survivors recounted the observed condition of the SCANDIES ROSE:

> *Yeah, finally, when I kind of got my bearings, I just remembered seeing the bow of the boat was up. And you could hear it too.*[36]

> *It went – first went -- and then it goes bow straight up in the air, and it was just like a toy in a tub, just getting like tossed around pretty good.*[37]

4.1.57. After being in the water approximately 20 minutes, Mr. [redacted] recounted that he saw the light from an inflatable liferaft that had automatically deployed off the SCANDIES ROSE. In testimony, he recounted that the current propelled the raft towards his position in the water.

> *I was very fortunate to see the glowing of the survival raft couple hundred yards off, and it kept -- I kept seeing it, and it kept going under. Waves were so big…*

> *…Luckily, I made it over to it, because the tide kind of brought it. It started to pass me, and then I kind of surfed a wave over to it. And then I was kind of tired at first when I got to it.*[38]

[35] Mr. [redacted] MBI Hearing Transcript, Pg. 1078
[36] Mr. [redacted] MBI Hearing Transcript, Pg. 571
[37] Mr. [redacted] MBI Hearing Transcript, Pg. 1077
[38] Mr. [redacted] MBI Hearing Transcript, Pg. 1078

4.1.58. Once inside the liferaft, Mr. [redacted] began calling for Mr. [redacted] After several minutes, Mr. [redacted] heard Mr. [redacted] shouts and was able to swim an unspecified distance towards the raft and was assisted aboard the liferaft by Mr. [redacted]

4.1.59. After a short time, the light inside the liferaft canopy went out. Wave action threatened to capsize the water-filled raft and the survivors were forced to move towards the lifting side to stabilize the raft.

4.1.60. One survivor recounted their efforts to locate additional surviving crewmembers

> *A lot of screaming still, like yelling out, hoping there would be someone else. There was, there was nobody else.*[39]

4.1.61. There is no evidence to suggest that any other crewmembers made it off the SCANDIES ROSE before it sank.

4.1.62. When both Mr. [redacted] and Mr. [redacted] were in the liferaft, they observed the canopy light of the SCANDIES ROSE's second raft, which had also auto deployed. They considered swimming to the other raft since the one they were in did not have interior illumination and they were initially unable to locate the raft's equipment pack.

4.1.63. At some point after they got in the raft, Mr. [redacted] and Mr. [redacted] located the liferaft's equipment pack. The crewmembers had difficulty accessing the equipment pack's contents due to lack of dexterity in the use of their hands while wearing the immersion suits, the environmental darkness, and prolonged exposure to frigid waters. They were eventually able to access the equipment contents. Mr. [redacted] testified:

> *Then we found the survival bag, which is stupid because they have it tight tied -- it's tied down super tight to the bottom. So it was completely underwater. And it's right by the door. And we're in 30-foot seas. I don't want to --anywhere near that door before I get, you know, I get bounced out of it or something.*[40]

4.1.64. Despite not seeing any rescue vessels or aircraft, the survivors fired all the aerial flares in the equipment bag. Mr. [redacted] recalled the experience in the raft:

> *I -- we, we were able to get to a bag and, and get some flares out. I thought I'd, you know, wait a little bit. The EPIRB got to kick the signal off. I don't want to start firing flares off yet. You know, we were able to fire, fire some flares off. It, it was a -- fired one off, two off, and then waited. Then three, four, and no one ever came. But the wind was so violent against that thing, I kept hearing -- I kept thinking I heard the chopper the whole time. It was just playing games with my head, the wind just beating that thing.*[41]

[39] Mr. [redacted] MBI Hearing Transcript, Pg. 572
[40] Mr. [redacted] MBI Hearing Transcript, Pg. 1080
[41] Mr. [redacted] MBI Hearing Transcript, Pg. 572

4.1.65. The survivors still had the properly functioning flashlight that was contained in the equipment pack for signaling.

Coast Guard Actions after Receiving "Mayday" Call

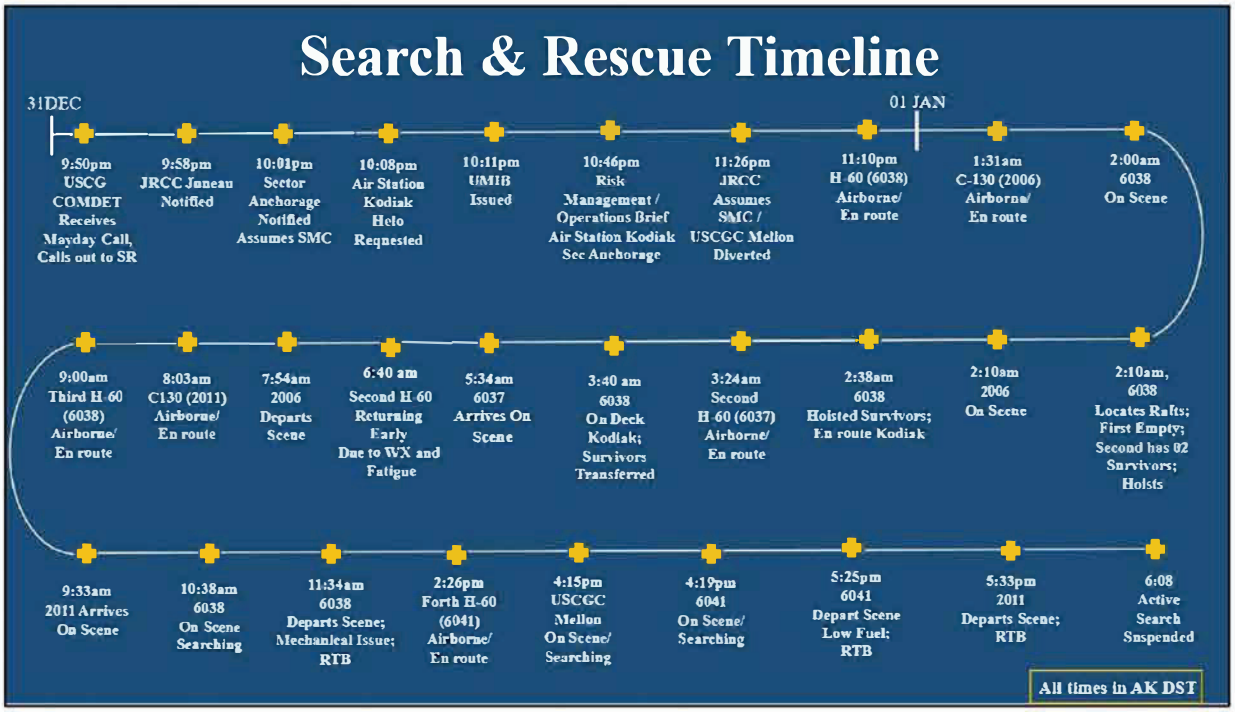


Figure 16 – Timeline of Coast Guard Search and Rescue (SAR) activities following the "mayday" call at 9 50 p.m., December 31, 3019, until the search was suspended at 6 08 p.m. on January 1, 2020. (Source CG Exhibit 076)

4.1.66. At approximately 9:58 p.m., COMMDET Kodiak reported the distress call to Joint Rescue Coordination Center (JRCC) Juneau.

4.1.67. At approximately 10:01 p.m., JRCC notified Sector Anchorage Command Center of the distress case and authorized the use of Air Station Kodiak to launch the ready helicopter. Sector Anchorage assigned a search and rescue (SAR) Mission Coordinator (SMC).[42]

4.1.68. After being briefed on the case, the JRCC SMC examined the last AIS position of the SCANDIES ROSE and the information in the "mayday" call from the SCANDIES ROSE and testified:

> *... So I went down, logged on my computer, and I saw that the vessel had gone late, meaning that the signal from the AIS transmitter was old. Typically, you get transmissions every several minutes, but this had been about 20 minutes since the last signal had been received.*[43]

[42] The SMC is the person assigned and designated to individual SAR cases, who provides incident oversight and supervision, as well as ensuring proper SAR mission execution.
[43] Captain Hollingsworth (USCG, Ret.) MBI Hearing Transcript, Pg. 1427

4.1.69. Following this last AIS broadcast and the mayday received via radio, the Coast Guard did not receive or find evidence of any further electronic signals broadcasted by the SCANDIES ROSE. This Marine Board verified that no other signals were received by AIS, Very High Frequency (VHF) radio, Digital Selective Calling (DSC)[44] alert, HF radio, satellite communications, EPIRB, or cell phone.

4.1.70. At approximately 10:08 p.m., Sector Anchorage requested Air Station Kodiak launch the rescue helicopter, a MH-60.

4.1.71. At approximately 10:11 p.m., after repeated attempts to call out and get a radio response from the SCANDIES ROSE to establish communications, Coast Guard Sector Anchorage and COMMDET Kodiak issued an Urgent Marine Information Broadcast (UMIB) on both HF and VHF radio frequencies. This UMIB requested that all vessels in the area of the SCANDIES ROSE's last known position (LKP) maintain a sharp lookout and report all sightings to the Coast Guard.

4.1.72. No vessels responded to the UMIB.

4.1.73. At approximately 10:12 p.m., JRCC reached out to Air Station Kodiak and confirmed that they had been directed to launch the ready MH-60 by Sector Anchorage.

4.1.73.1. A flight crew was on duty and ready to fly at Air Station Kodiak and the plan was for that aircrew to conduct a helicopter sortie to search for the SCANDIES ROSE and any survivors.

4.1.73.2. The flight crew and helicopter in Kodiak were in a Bravo-0 status. The requirement is to have one helicopter in this status at Air Station Kodiak.

4.1.74. The remoteness of the accident location and the severe forecasted weather conditions along the route resulted in an increased complexity for the rescue operation. This required the crew to conduct additional flight planning and they made a decision to take on additional fuel for the helicopter to extend its range and search time when it arrived at the search location.

4.1.75. Using AIS, the watchstanders identified that the nearest vessel to the SCANDIES ROSE was the RUFF & REDDY, located approximately 28 NMs from the LKP. Command Center watchstanders then looked up the RUFF & REDDY's vessel details and found a contact number for a landside dispatcher. They contacted the dispatcher, who relayed the Coast Guard's request for the vessel to contact the Command Center.

[44] Standard for transmitting pre-defined digital messages, including distress messages, via HF, MF and VHF maritime radio systems.

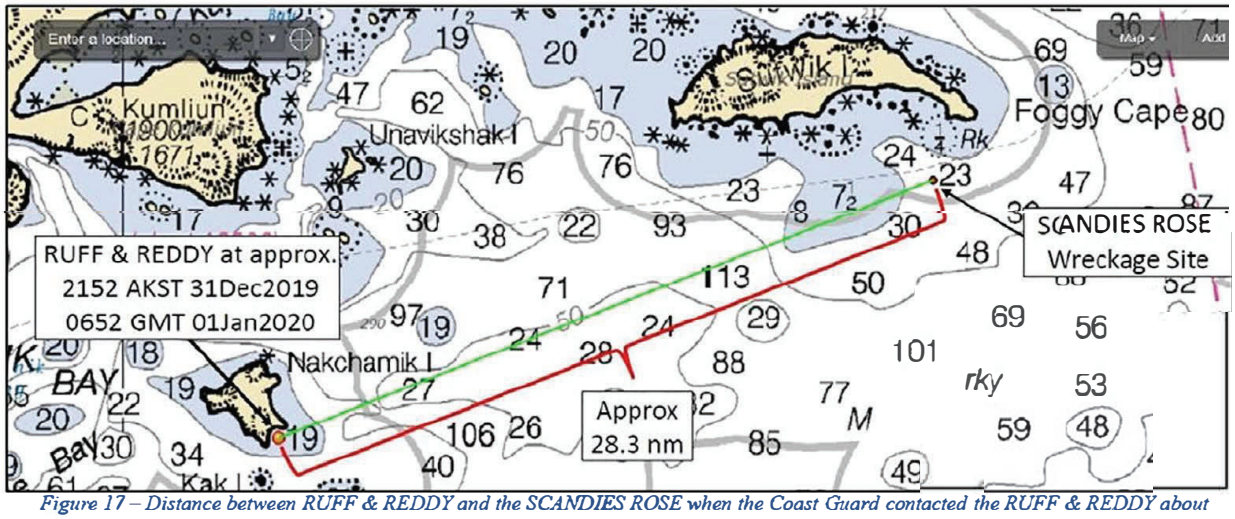


Figure 17 – Distance between RUFF & REDDY and the SCANDIES ROSE when the Coast Guard contacted the RUFF & REDDY about the possibility of assisting the SCANDIES ROSE in distress. (Source CG Exhibit 023, with markups)

4.1.76. At approximately 11:00 p.m., the RUFF & REDDY's Captain was notified by a crew person who took the call that the Coast Guard requested that he contact the Command Center. The RUFF & REDDY was anchored close to Nakchamik Island where they had been anchored since 5:00 a.m. that morning in order to shelter from the severe sea/wind conditions. Earlier in the day, between approximately 2:00 a.m. and 3:00 a.m., the Captain recalled the observed weather conditions and the resultant icing.

> *We were starting to build a little ice on the bow, northwest probably, I guess at the time, 25- to 30-knot winds. Started to accumulate ice on the bow and on the rails, and a little bit of spray on the pots there. So we decided to hold up on the lee side in Nakchamik.*[45]

4.1.77. Shortly after 11:00 p.m., the Captain of the RUFF & REDDY called the Command Center via satellite phone.

4.1.77.1. The Command Center confirmed that the SCANDIES ROSE was in distress based on the "mayday" call, and it may have sunk. Based on the information at hand, the Coast Guard asked if the RUFF & REDDY was able to assist in the distress response as the closest vessel to the LKP.

4.1.77.2. No one on the RUFF & REDDY heard the SCANDIES ROSE "mayday" call nor did they hear the UMIBs the Coast Guard was transmitting about the distress call looking for immediate assistance.

4.1.77.3. At the time of the phone call, the Captain testified about the observed weather conditions the RUFF & REDDY was experiencing

> *As we were in the lee, we weren't taking any spray. We were in the lee of the island there. Very cold, very cold, our inside was freezing up. Our windows were getting ice just from the condensation, but I didn't have an outside thermometer, so I can't say*

[45] Captain [redacted] MBI Hearing Transcript, Pg. 838

the temperatures. But obviously, they were below freezing for sure. Snow, heavy winds, heavy gusts out of the northwest, but we weren't accumulating any ice due to spray. We were in the lee of the island there, so we didn't have any.[46]

4.1.78. Coast Guard watchstanders inquired and determined that the RUFF & REDDY could not assist based on the severity of the weather. The Captain testified about his reasoning for declining the Coast Guard's request for assistance:

I declined due to weather and the conditions outside behind the lee of the island. I could not travel with a load of gear. So I declined on being able to assist.[47]

4.1.79. Between 10:46 p.m. and 11:20 p.m., Sector Anchorage Operations Unit (OU)[48] and Air Station Kodiak Operations Officer (OPS) had a conference call and discussed the need for HC-130 fixed wing aircraft support. They also discussed the anticipated need and timing of additional MH-60 helicopters and crews based on the complexity of the SAR case. Sector Anchorage OU and Air Station Kodiak OPS agreed to launch the HC-130 staged out of Joint Base Elmendorf/Richardson (JBER) located in Anchorage, AK and recommended recall of a second MH-60 crew until either the first MH-60 or HC-130 arrived on scene or located objects in the search area.

4.1.79.1. The ready HC-130 aircraft was relocated to JBER in Anchorage, AK due to weather and visibility at Air Station Kodiak. During times of inclement weather, affecting the runways in Kodiak, Air Station Kodiak relocates their ready HC-130 to JBER in Anchorage, where that aircraft assumes a Bravo-2 status. This is in accordance with the Seventeenth District (D17) SAR Plan and Air Station Kodiak Standard Operating Procedures.

4.1.79.2. The relocated HC-130 was now 417 NMs from the LKP of SCANDIES ROSE. Air Station Kodiak is located 190 NMs from the LKP of SCANDIES ROSE.

[46] Captain [redacted] MBI Hearing Transcript, Pg. 839
[47] Captain [redacted] MBI Hearing Transcript, Pg. 836
[48] The OU is a watchstanding position at a Command Center/JRCC.

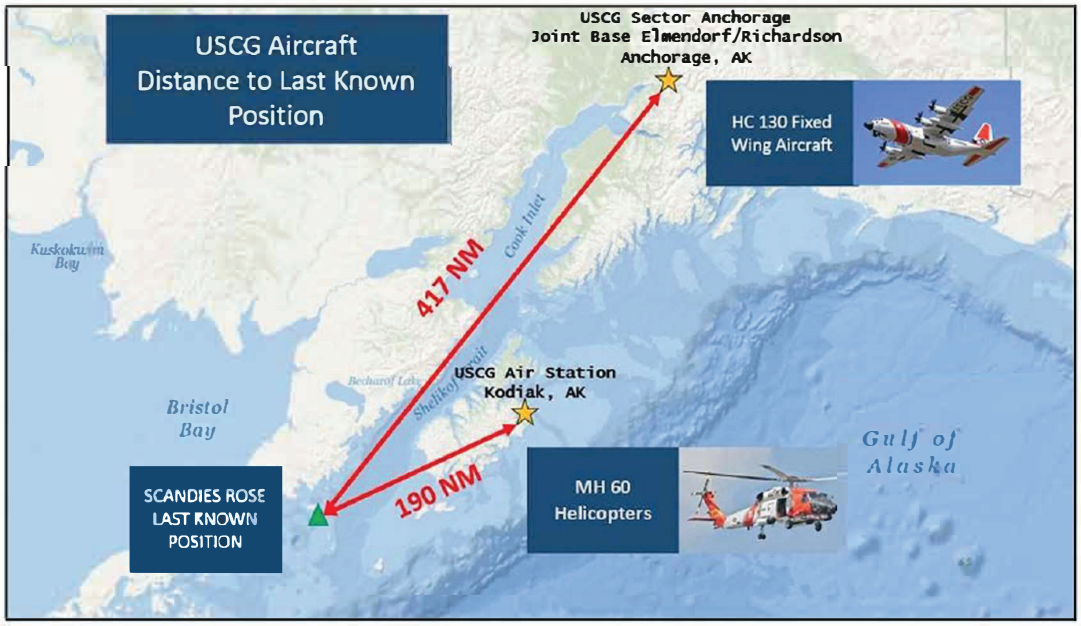


Figure 18 – Location of Coast Guard helicopters and fixed wing aircraft that responded to the SCANDIES ROSE sinking with distances to the green triangle representing the SCANDIES ROSE, last known position in nautical miles. (Source CG Exhibit 076, with markups)

4.1.79.3. The HC-130 would provide another SAR asset on scene as well as a set of eyes on the helicopter rescue operation. The HC-130 would also act as a communications relay platform due to the distance of the rescue area from communications facilities.

4.1.79.4. The holiday evening created difficulty in identifying a crew for a second MH-60 helicopter. The Air Station was not required to maintain a Bravo-2 crew and other potential crews were off duty.

4.1.80. At approximately 11:26 p.m., JRCC SMC relieved the Sector Anchorage SMC after determining that JRCC was the primary SAR AOR and the JRCC/D17 assumed tactical control of all the responding Coast Guard resources.

4.1.81. At approximately 11:44 p.m., JRCC directed the U.S. Coast Guard Cutter (CGC) MELLON, which was sheltering from the weather in Beaver Inlet near Dutch Harbor, 185 NMs from the SCANDIES ROSE's LKP, to proceed at best speed to the search area. CGC MELLON's estimated time of arrival based on weather conditions was 16.25 hours, or 4:15 p.m. January 1, 2020.

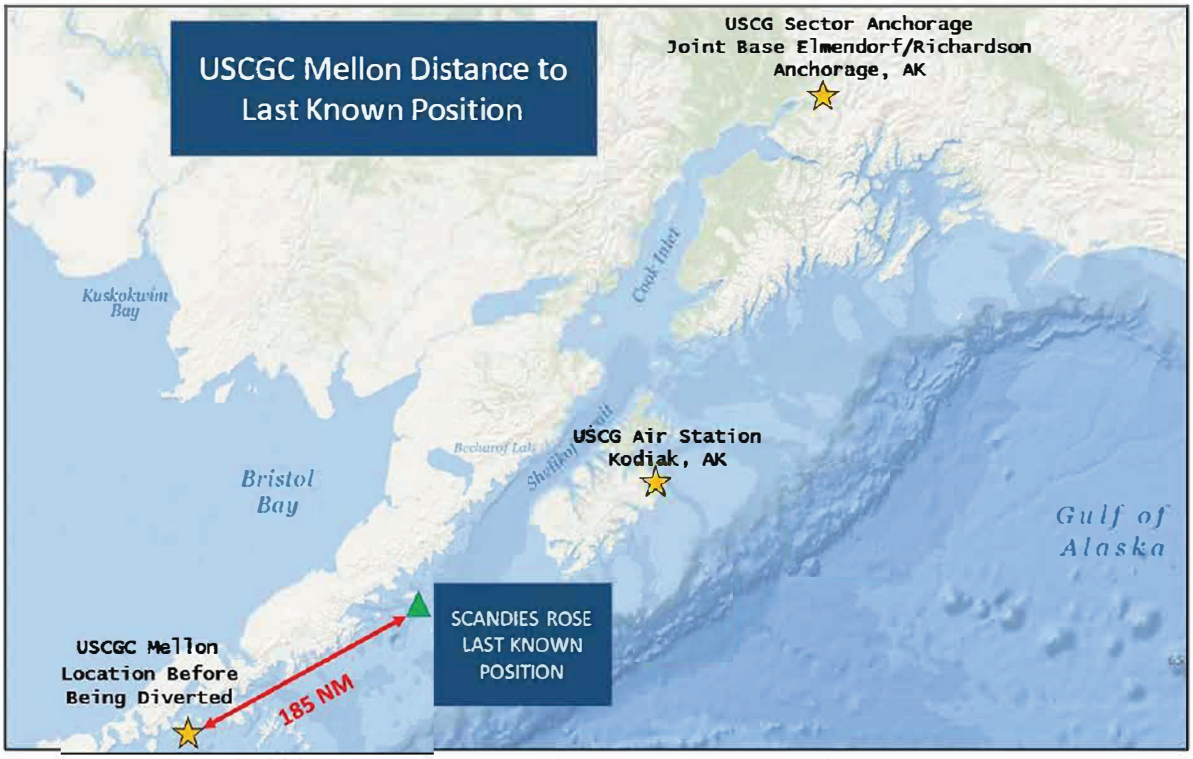


Figure 19 – Location of the CGC MELLON with distances to the green triangle representing the SCANDIES ROSE last known position in nautical miles. (Source CG Exhibit 076, with markups)

4.1.81.1. Based on the ship's logs, the CGC MELLON observed 20 kt winds from 288° True, overcast/snow, air temperature at 30° Fahrenheit, and water temperature of 36° Fahrenheit.[49]

4.1.81.2. At the time the CGC MELLON was diverted, the helicopter that was assigned to be onboard the ship for this type of deployment was not aboard. The helicopter was in Dutch Harbor, AK waiting for parts for maintenance.

4.1.82. At approximately 11:30 p.m., the CG-6038, a Coast Guard MH-60 helicopter, departed Air Station Kodiak to conduct SAR operations at the LKP of the SCANDIES ROSE.

4.1.83. At approximately 11:51 p.m., the JRCC Command Duty Officer (CDO), and Air Station Kodiak Operations Duty Officer (ODO) discussed the logistical details on refueling options and recall of crews. The ODO supported the course of action to recall a second MH-60 helicopter air crew but recommended that the second helicopter be kept on the ground at Air Station Kodiak and only be launched if the HC-130 or MH-60 crews detected survivors that required hoisting by the helicopter at the scene. JRCC CDO concurred with this recommendation.

4.1.84. On January 1, 2020, at approximately 12:55 a.m., the JRCC CDO and Air Station Kodiak ODO re-engaged on the issue of refueling locations and viable options for these

[49] CG Exhibit 133

search operations and potential survivor recovery. The intent of assessing refueling at an alternate location other than back at the Air Station was to determine if it would extend the helicopters' on scene search time and potentially improve rescue outcomes.

4.1.84.1. Although the next MH-60 helicopter crew was not yet at the Air Station, the ODO anticipated that they could have a second MH-60 helicopter airborne at 2:30 a.m. for an arrival in the search area at 4:30 a.m.

4.1.84.2. One refueling alternative was Sand Point, AK. While this was closer to the search area, the added evolution would only add 15 minutes of additional search time but would create an added risk of icing for the aircraft.

4.1.84.3. Another alternative refueling option was Sitkinak, AK, which would give the CG-6038 as much as 30 minutes of additional on scene time and would also create the same risk of icing for the aircraft.

4.1.85. The helicopter pilot described the conditions that he encountered on the flight to the last position of the SCANDIES ROSE

…We were anticipating bad weather, but I think it ended up being a lot worse than what we thought right off the bat. Once we got to the other side of the island we immediately got into about 300-foot ceilings and a half a mile to no visibility where we had to fly the aircraft between islands to get to the Shelikof Strait where -- with the headwinds and the winds that are with the terrain causes severe turbulence. So I think this was the most challenging flight of my career just getting out there.[50]

4.1.86. At approximately 1:31 a.m. January 1, 2020,[51] a HC-130 (CG-2006) took off from Joint Base Elmendorf/Richardson in Anchorage, AK to conduct joint SAR operations at the LKP of the SCANDIES ROSE. The HC-130 would act as a communications relay platform due to the distance from Kodiak.

4.1.87. At approximately 1:46 a.m., JRCC SMC and Air Station Kodiak OPS talked to each other to discuss refuel locations and availability of additional crews.

4.1.87.1. The helicopter and crew were at the Air Station and could be launched immediately.

4.1.87.2. OPS indicated a third MH-60 helicopter aircrew could be recalled and available at 8:00 a.m. that morning.

4.1.87.3. The decision was reached that Sand Point would be the primary re-fueling location for responding MH-60 helicopters.

[50] LT [redacted] MBI Hearing Transcript, Pg. 1458

[51] The date in CG Exhibit 076 says January 1, 2021, but this is a typographical error. The actual date was January 1, 2020.

4.1.87.4. At approximately 2:00 a.m., JRCC CDO directed COMMDET Kodiak to advise CG-6038 that they were to refuel in Sand Point in order to provide additional on-scene search time.

4.1.88. At approximately 2:10 a.m., the crew on board CG-6038 arrived to the vicinity of the accident site and began searching for any evidence of the SCANDIES ROSE and survivors.

4.1.89. Upon the CG-6038's arrival in the search area, observed weather conditions were seas of 20-30 ft, winds 35-50 kts, cloud ceiling varying from 200-500 ft above ground level (AGL), rain/snow, heavy at times, water temperature 38° Fahrenheit, and air temperature of 10° Fahrenheit. The pilot testified that his instruments indicated that he was making excursions vertically of up to 30 ft, confirming sea wave heights of up to 30 ft.

4.1.90. The helicopter pilot recalled how the on scene weather conditions changed as they neared the search area improving the helicopter's ability to search:

> *So once we got on scene, it was like the weather miraculously opened up to about two NMs, and we were flying towards the box, and we were under night-vision goggles the entire time, which is probably the only way we spotted the -- what looked like a flashing light at the time.*[52]

4.1.91. After several minutes, the CG-6038 crew located a SCANDIES ROSE liferaft floating on the surface of the water with the aid of the flashing exterior canopy light. The rescue swimmer was lowered via hoist down to the liferaft. No persons, survivors or otherwise, were located in the first liferaft that was examined.

4.1.92. A decision was made to keep the empty liferaft inflated in the event other, undiscovered, surviving crewmembers were able to reach it.

4.1.93. Around the same time, shortly after 2:00 a.m. (4 hours after abandoning ship), Mr. [redacted] and Mr. [redacted] saw what they believed was a vessel's mast light in the vicinity of the other liferaft.[53] With no flares left to fire, they used a flashlight from the raft's equipment pack to signal by waving the flashlight in a side-to-side motion. The rescue helicopter pilot recounted

> *And as we brought the swimmer up, the pilot in the right seat who was flying happened to see under his night-vision goggles a waving light, and it was definitely not like the normal blinking light. It was a side-to-side, so we knew it was somebody trying to signal us. So we quickly got the rescue swimmer back up into the helicopter, and we kind of like had the flight mechanic, you know, brief the swimmer on what we were doing, what we saw. And at that time, the -- even the flight mechanic was saying that he had to de-ice the rescue swimmer. It was so cold that the rescue swimmer, just from going out the door and coming back up, was covered in ice.*[54]

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[52] LT [redacted] MBI Hearing Transcript, Pg. 1460

[53] At this point, the survivors' accounts are interlaced with the precise times of the Coast Guard activities in the search and rescue operations.

[54] LT [redacted] MBI Hearing Transcript, Pg. 1461

4.1.94. At approximately 2:08 a.m., the crew of the CG-6038 commenced hoisting operations to hoist Mr. [redacted] and Mr. [redacted] out of the liferaft. The pilot testified

> *...it was probably the hardest hoisting I've ever had to do with the other pilot flying, and there was times where, I mean, a wave would hit, and all of a sudden, the raft would be out the left side of the helicopter, and we we're having to, you know, work together to kind of keep a steady hover over this raft. And somehow, we got the swimmer to the raft, and he was able to hook the survivor to himself and then bring him up.*[55]

4.1.95. At approximately 2:11 a.m., the fixed wing aircraft, CG-2006 reported arrival at the search area.

4.1.96. Shortly after that, the crew of the CG-6038 successfully recovered crewmembers [redacted] and [redacted]

4.1.97. The helicopter crew asked the survivors about the possibility that there were other survivors and began to follow protocols used to treat hypothermic survivors in the aircraft.

4.1.98. At approximately 2:26 a.m., the JRCC CDO requested Air Station ODO to direct the CG-6038 with the survivors to Sand Point, refuel the aircraft, and return to the search area to continue the search for the five remaining crew.

4.1.99. The rescue helicopter pilot talked about his decision based on the circumstances his crew was facing.

> *... we had two fuel options: it was Sand Point, which was a shorter distance, but we would've had to have fought a headwind to get there, and based on the calculations of that and then plugging in Kodiak, we determined it was the same amount of time to get back to Kodiak with the -- what we -- since we had a headwind coming out, we knew we'd have a tailwind going back. So we chose with the known fuel there that we had there and the higher level of care, we just made a quick decision to go back to Kodiak to bring the survivors back.*[56]

4.1.99.1. On the return trip, the Aircraft Commander made the decision to shut off the Auxiliary Power Unit (APU) which powered auxiliary equipment such as interior heaters in an effort to conserve fuel for the return trip to Kodiak.

4.1.100. At approximately 2:58 a.m., the Air Station Kodiak ODO advised the JRCC Juneau that the second MH-60, CG-6037, crew was finishing taking on additional fuel and would be airborne within 20 minutes.

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[55] LT [redacted] MBI Hearing Transcript, Pg. 1462
[56] LT [redacted] MBI Hearing Transcript, Pg. 1463

4.1.101. Using on-scene weather conditions reported back from Coast Guard aircraft, the JRCC produced different drift models for liferafts or any crewmembers who were drifting in the water.

4.1.102. Due to an error in the transposition of the coordinates into the computer modeling software Search and Rescue Optimal Planning System (SAROPS), one search model was built for an area north of Sutwik Island, which was used by the second Coast Guard helicopter, the CG-6037. The SAR Program Manager talked about that error:

> *Unfortunately, what happened was the -- in some way, it's not completely clear, but the position was passed incorrectly. And so the second set of searches were based off of that brown circle, and that's where the Coast Guard assumed the second liferaft was ...It would be, it would be very hard, based on the weather conditions that night, for a search object at this point in time to have gone around the northeast tip of Sutwik Island and end up north of Sutwik Island. I know they have these discussions on the watch floor, but from when I talked to them, they just had nothing else to base it off of, so they just went with what they had.*[57]

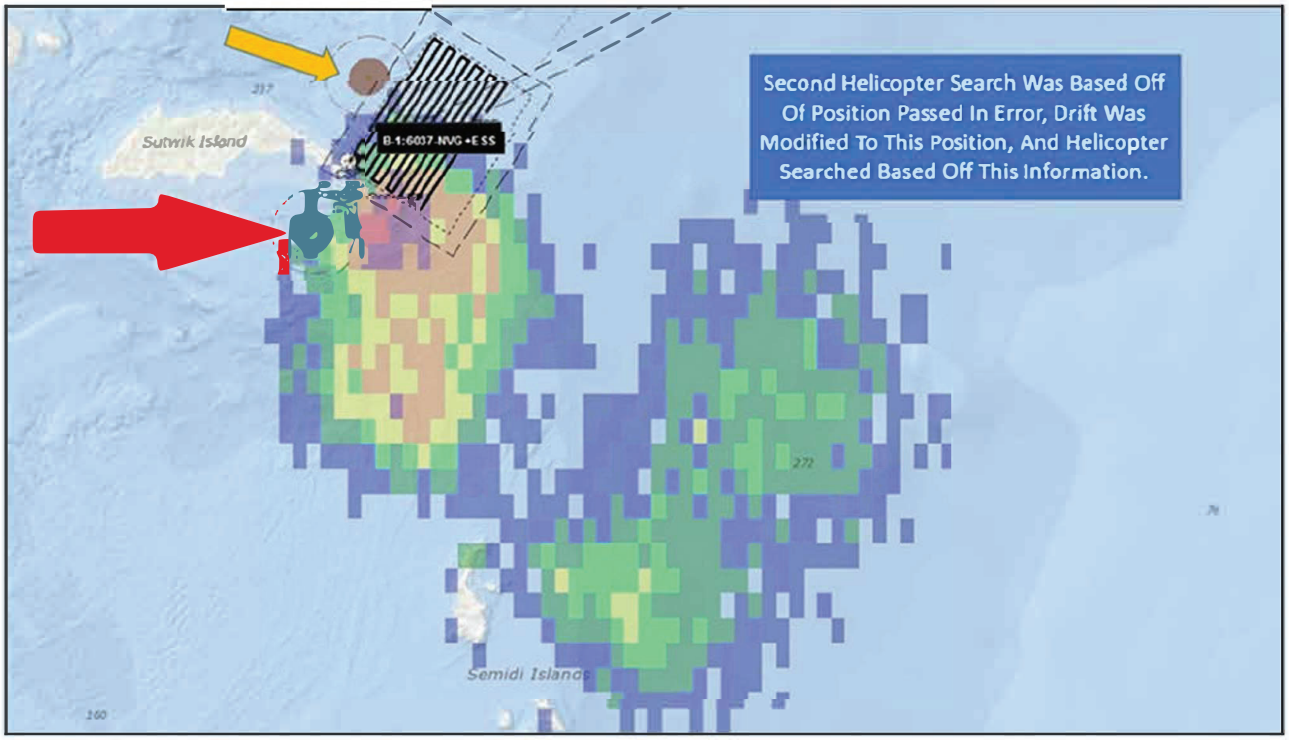

Figure 20 – Second search pattern with red arrow indicating the position of the SCANDIES ROSE from the distress radio message. Yellow arrow points to the incorrect position of the liferaft which was used as the center point of search #2. The small colored rectangles represent the computer modeling prediction of the best location for searching based on the computer drift modelling. Red and magenta colors indicate the greatest possible chance of search success based on the modeling of the weather conditions and the characteristics of the search object. (Source CG Exhibit 076, with markups)

[57] Mr. [redacted] MBI Hearing Transcript, Pg. 1384

4.1.103. At approximately 3:38 a.m., while the CG-6038 was enroute to base with two survivors, the second helicopter, CG-6037 took off from Air Station Kodiak to continue the search for additional survivors.

4.1.104. Upon identifying the error in the liferaft assumed position during the second search, the correct coordinates were confirmed and the correct calculated positions were incorporated into the subsequent search patterns used by the search and rescue aircraft and the CGC MELLON.

4.1.105. At approximately 5:34 a.m., the second helicopter, CG-6037 arrived on scene to the search area and commenced search efforts. During the search timeframe, the aircrew experienced severe inclement weather and became mission ineffective.

4.1.106. At approximately 6:40 a.m., the helicopter with the survivors landed at Air Station Kodiak where the survivors were transferred from the helicopter to a waiting ambulance and driven to Kodiak Island Medical Center in Kodiak, AK. Both were treated for hypothermia and released later the same day, January 1, 2020.

4.1.107. At approximately 6:40 a.m., the Air Station Kodiak ODO advised the JRCC CDO that CG-6037 was returning to base due to weather and crew fatigue. The SAR Program Manager described the search conditions the second helicopter crew encountered as "pretty horrible" and continued to say that

> *Between wind and visibility, it was very hard -- and wave actions, it was very hard to see anything, and the helicopter crews went through quite a bit of fatigue on scene just to try to keep the helicopter kind of going straight line searching.*[58]

4.1.108. The JRCC CDO and SMC directed immediate recall and launch of the oncoming flight crew.

4.1.109. At approximately 7:47 a.m., Air Station Kodiak ODO advised the JRCC CDO that the first HC-130, CG-2006, had 1.5 hours remaining on scene.

4.1.110. From approximately 8:00-8:30 a.m., the third MH-60 helicopter crew reported to base and was making preparations to get airborne.

4.1.111. At approximately 8:40 a.m., the original rescue helicopter, CG-6038, was refueled and ready. It got airborne with a new flight crew and headed back to the search area to continue SAR efforts.

4.1.112. At approximately 8:54 a.m., the HC-130, CG-2006, departed the search location and began its flight back to Air Station Kodiak.

[58] Mr. [redacted] MBI Hearing Transcript, Pg. 1381

4.1.113. At approximately 9:00 a.m., a second HC-130, CG-2011, got airborne from Air Station Kodiak and headed to the search area. The CG-2011 arrived on scene at approximately 9:33 a.m.

4.1.114. From approximately 9:33 a.m. through 10:30 a.m., search units continued to search the area using the search patterns created with the search and rescue software taking into account the anticipated drift of any possible search objects such as possible survivors in the water.

4.1.115. At approximately 10:38 a.m., the CG-6038 arrived on scene and commenced search efforts in conjunction with the other search units looking for survivors. However, this helicopter was forced to end their search efforts early due to an Auxiliary Power Unit (APU) failure. At approximately 11:34 a.m., the CG-6038 left the search area and returned to Air Station Kodiak.

4.1.116. At approximately 2:26 p.m., after landing back at Air Station Kodiak and switching out rescue swimmers and aircraft, that flight crew was once again airborne in a new helicopter, the CG-6041, heading back to the search area. The CG-6041 arrived in the search area at approximately 4:19 p.m.

4.1.117. At approximately 4:15 p.m., the CGC MELLON arrived on scene in the search area to assist with search and rescue efforts and began searching using a search and rescue pattern provided by the computer software modeling based on visibility and characteristics of the search target.

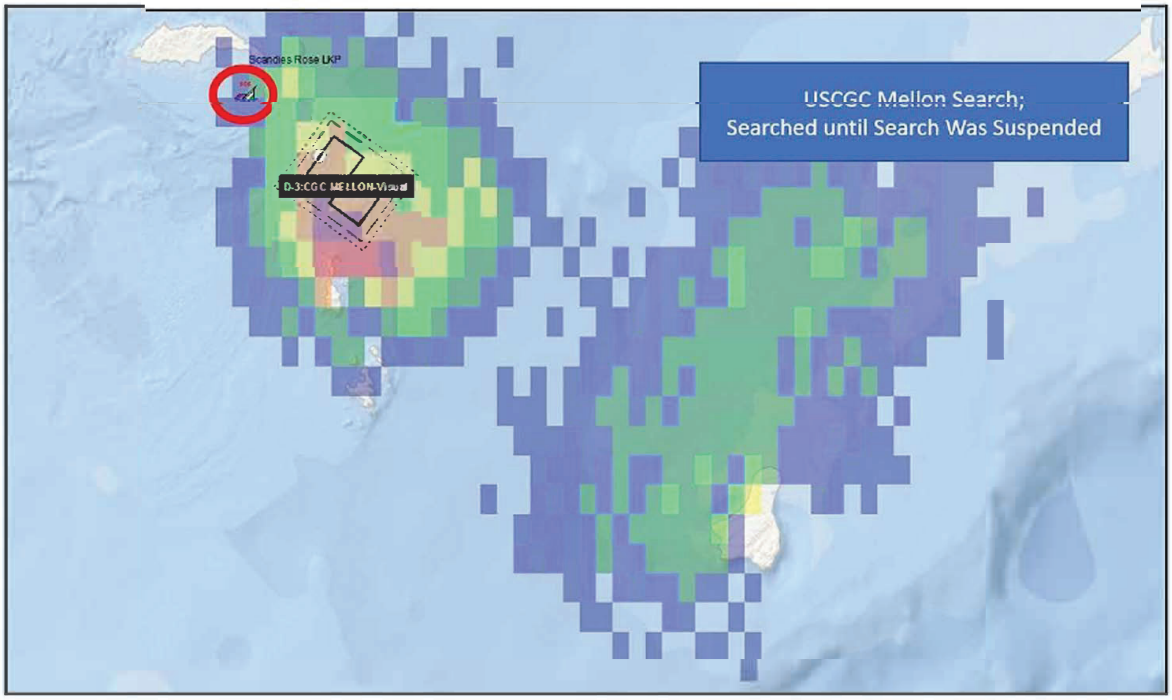

Figure 21 – Black line indicates a "creeping line" search pattern used by the CGC MELLON during the search. This visual search pattern considers the search object and visibility to provide optimum detection probability. The yellow, red and magenta colored rectangles indicate the areas with the highest probability of search target detection based on a wide array of variables. The red circle indicates the location of the SCANDIES ROSE when they called the "mayday" high frequency call to the Coast Guard. (Source CG Exhibit 076, with markups)

4.1.117.1. The CGC MELLON deployed crewmembers out onto the cutter's deck to conduct manual removal of the ice that had formed on the bow area and superstructure during its transit to the search area. The crew used tools to manually break the ice off rails, deck surfaces, and other fittings. This was done specifically during daylight hours to reduce the risk to the crew.

Figure 22 – Image of USCGC MELLON crewmembers on the bow of the vessel breaking ice shortly after arriving in the search area. The red circle shows the difference between a de-iced portion of the port side railing and the parts of the ship that had not yet been de-iced highlighting the level of ice accretion the CGC MELLON experienced as it steamed to the SCANDIES ROSE's last known position. (Source Coast Guard Exhibit 095 screen capture, with markups)

4.1.118. The CGC MELLON's logs recorded the following weather observations while on scene: 32-knot winds from 280 degrees True, 22° Fahrenheit air temperature, 36° Fahrenheit water temperature and sea and swell height of 6 ft.

4.1.119. At approximately 5:25 p.m., CG-6041, low on fuel, departed scene and returned to Air Station Kodiak.

4.1.120. At approximately 5:33 p.m., the CG-2011 departed the active search area enroute to Air Station Kodiak.

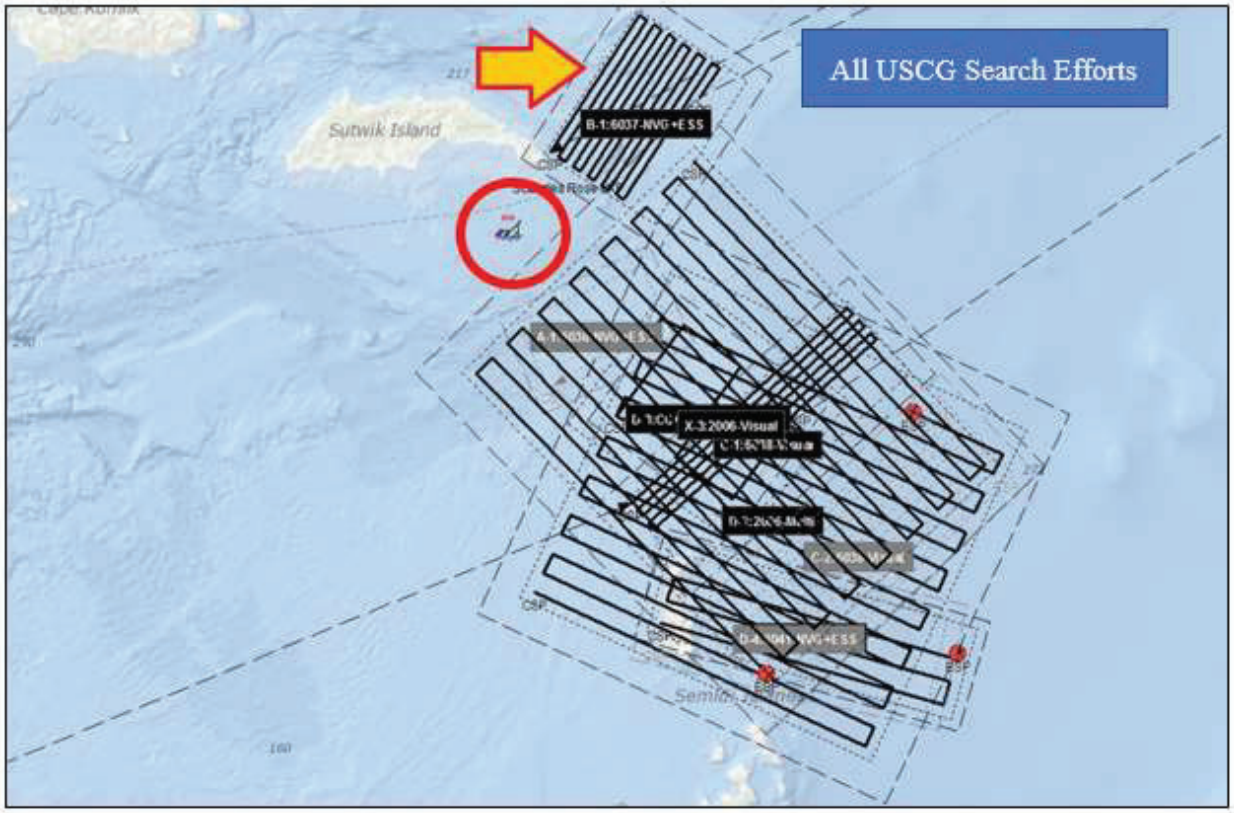

Figure 23 – Red circle indicates the position of the SCANDIES ROSE when the Captain called the Coast Guard in distress. Black lines represent the search patterns used by the aircraft and ship in the search of potential crew that were not initially rescued by the first helicopter on the scene. The yellow arrow points to the second search pattern that resulted from the error in transposing the geographic position of the liferaft that was used as a drift marker for the second search by a helicopter. (Source CG 076, with markups)

4.1.121. On January 1, 2020, at 6:08 p.m., the Coast Guard District 17 SAR Coordinator,[59] suspended the active search and rescue operations. The CGC MELLON was, subsequently, released from the search area to resume the ship's patrol operations.

4.1.122. A portion of the Coast Guard's SAR Case Review, CG Exhibit 078, summarizes the aircraft search and rescue activities:

4.1.122.1. Due to the 380-mile roundtrip transit from AIRSTA Kodiak to the search area, the on-scene endurance of responding MH-60 helicopters was expected to be approximately one hour.

4.1.122.2. AIRSTA Kodiak provided a total of four MH-60 sorties utilizing three different aircrews.

4.1.122.3. Over the 19 hour and 43 minute period from distress notification to the Active Search being Suspended (ACTSUS), there was approximately 3.5 hours of total MH-60 helicopter search effort.

[59] The SAR Coordinator is the person within the Coast Guard watchstanding organization with overall responsibility for establishing and providing SAR services and ensuring that planning for those services is properly coordinated.

4.1.122.4. A total of two HC-130 sorties were conducted, providing 15 hours of on-scene presence and communications support. HC-130s were not able to provide search coverage due to on-scene weather conditions.

4.1.122.5. There were a total of 10 searches planned with six searches completed before ACTSUS was granted.

4.1.122.6. The duration of the SAR case was 20.30 hours. In that time, a total of 781 NM^2 was searched over the course of 10.34 hours of on-scene search time.

4.2. Additional/Supporting Information:

Post-Casualty Wreckage Survey

4.2.1. Following the sinking of the SCANDIES ROSE, the owners of the vessel hired Global Diving, a marine salvor and a hydrographic survey company to oversee a project to find the vessel and document the wreck.

4.2.2. On February 9, 2020, the M/V ENDURANCE, a vessel owned and operated by Paradigm Marine, departed Kodiak harbor for the purpose of acting as an operations platform for a variety of specialized survey equipment and a Remotely Operated Vehicle (ROV). [60] The mission's objectives were to locate the SCANDIES ROSE and examine the site to determine the circumstances related to the sinking of the vessel with particular concern for the starboard side of the vessel. The person in charge of the operation in testimony stated

> *... before we left dock, I mean, it was obvious there was questions about the fabrication work that had been going on prior to the ship sailing and that that was a potential cause for her potentially to have gone down if the repair had not been done correctly or it failed. So we were -- our job was to look and see what we could see and record it as much as we possibly could, and we just couldn't get there.*[61]

4.2.3. On the morning of February 10, 2020, the ENDURANCE arrived at the SCANDIES ROSE's LKP. Using multi-beam sonar, a bathymetric survey was completed and the SCANDIES ROSE was located in about 160 feet of water at position 56º29.4682 N, 157º-2.1082 W.

[60] CG Exhibit 008
[61] Mr. [redacted] MBI Hearing Transcript, Pg. 385

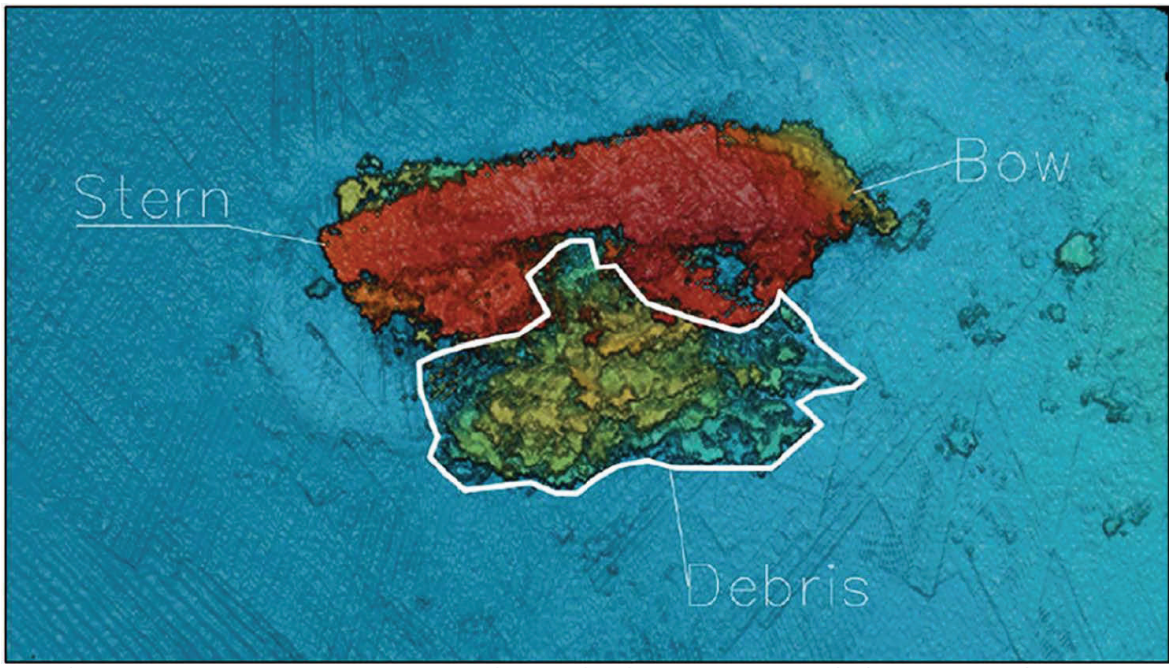

Figure 24 – Multibeam bathymetric surface image of the SCANDIES ROSE lying on its starboard side in an east-west direction with the bow pointing east. Off the deck side of the vessel is a debris field roughly 94 ft x 42 ft with height off the seafloor of approximately 20ft. (Source CG Exhibit 008, F/V SCANDIES ROSE Search and Survey Report, pg. 13)

4.2.4. The SCANDIES ROSE lies intact on her starboard side in a generally east-west direction with the bow pointing east. At the time of the ENDURANCE's arrival, a fuel oil sheen stretching 0.25 miles was observed on the water's surface. Off to the side of the vessel was a debris field roughly 92 ft x 42 ft across with a vertical height of about 20 ft off the sea floor. Buoyant fishing buoys with trailing lines still attached to the vessel extended upward to within 40 ft of the water's surface. In addition, there is a larger debris field extending to the eastern side that may contain some of the SCANDIES ROSE associated wreckage.

4.2.5. Due to winter weather and extremely strong and shifting underwater currents, a second survey by the ROV was conducted on February 13, 2020 in attempt to gain better video quality of the SCANDIES ROSE's condition and debris field. The underwater work was hampered by the collection of submerged debris including buoy lines stretching towards the surface from the vessel.

4.2.5.1. The origin of the diesel fuel sheen could not be positively identified.

4.2.5.2. A search was conducted for the EPIRB and the empty EPIRB bracket was located on the port rail aft of the wheelhouse door. The search did not locate the EPIRB.

4.2.5.3. Several of the SCANDIES ROSE's external doors were open, most notably the door leading to the accommodation spaces that was located on the after bulkhead on the starboard side and a person from the ROV team could be heard stating on the video that it appeared to have been damaged by the impact with the seafloor.

Figure 25 – After starboard side accommodation door of the SCANDIES ROSE on the after bulkhead showing damage. (CG Exhibit 008, with markup)

4.2.6. The ROV survey was unable to document the starboard side of the vessel because of the way the SCANDIES ROSE was lying on the seafloor.

4.2.7. The ROV survey indicated that there was evidence of some damage on the visible after starboard side of the vessel, including damage to the aft handrails, door, and top of the exhaust stack. The masts were missing from the vessel and located on the sea floor in proximity to the crab pots and associated gear.

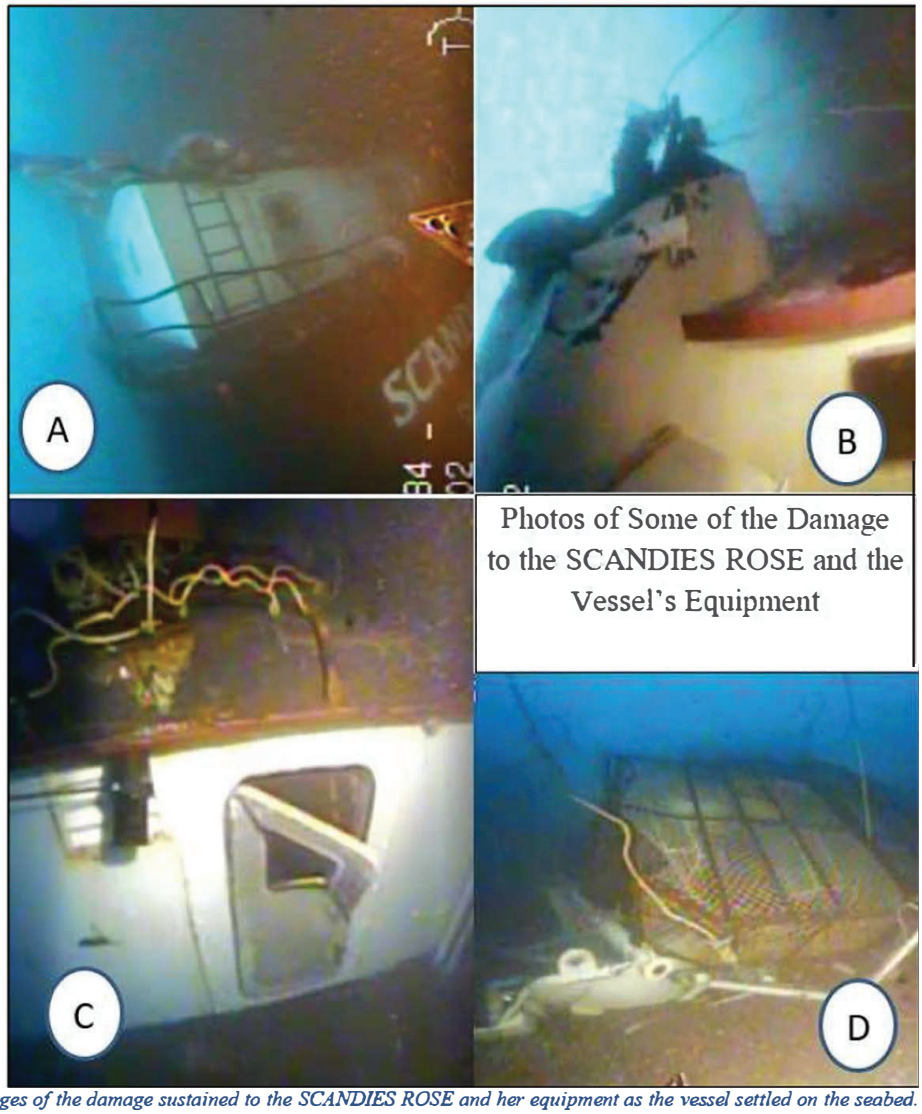

Figure 26 – Images of the damage sustained to the SCANDIES ROSE and her equipment as the vessel settled on the seabed. Image "A" shows the damage to the railings that run across the stern of the vessel. "B" indicates the damage to the top of the exhaust stack while "C" shows the damage to an external door aft from the superstructure. Finally, image" D" shows the mast and one of the large crab traps on the sea floor near the SCANDIES ROSE. (Source CG Exhibit 009 still frames, with markup)

4.2.8. The ROV footage of the SCANDIES ROSE's bottom, port side, and stern was examined to determine if there was any evidence of damage or visible defects that could have contributed to the sinking. There was no discernable evidence to support any issues in that area of examination that may have been related to the cause of the vessel sinking.

4.2.9. The ROV inspection of the wheelhouse showed what appear to be the remains of two people inside the wheelhouse. The verification and identification of the presumed deceased victims was incomplete as the ROV did not enter the wheelhouse and had limited vantage points.

4.2.10. No attempts were made to access the bridge. No other victims were located in the survey area.

4.2.11. The Coast Guard attempted to retrieve and weigh SCANDIES ROSE crab pot(s) with the assistance of another government agency. On September 23, 2020, the National Oceanic and Atmospheric Administration (NOAA) vessel OSCAR DYSON made five attempts to recover submerged pots from the SCANDIES ROSE's debris field with a grappling device. Efforts to retrieve one or more pots and gear were unsuccessful. The intention of this effort was to examine, measure and weigh an actual pot and gear from the SCANDIES ROSE.

Post-Casualty Chemical Testing

4.2.12. Per 46 CFR § 4.06-3, after any Serious Marine Incident (SMI) such as the loss of the SCANDIES ROSE, an owner is required to conduct drug and alcohol testing of all persons involved. Per regulations, a post-casualty alcohol test shall be conducted within 2 hours[62] of the casualty and a post-casualty Department of Transportation (DOT) approved drug test shall be conducted within 32 hours of the casualty.

4.2.13. Following the incident, the surviving crewmembers were not tested for alcohol because the regulatory time window for the testing had been exceeded by the time they arrived at the hospital.

4.2.14. [redacted] and [redacted] each submitted a urine sample utilizing at-home drug test kits purchased locally. The tests were brought to the hospital, but were ultimately conducted at the home of [redacted].[63] The hospital would not administer the tests as it was not in hospital protocols for this course of care. The vessel manager asked [redacted] in Kodiak to obtain test kits in an attempt to satisfy the requirements for post-casualty drug testing and she obtained two five-panel test kits. [redacted] testified about her efforts to meet the post casualty drug testing requirements

> *I did with the help of* [redacted]*. First we tried to get the hospital to do the drug testing. They wouldn't because it's not in the service of their treatment. So I asked* [redacted] *if she would go to Walmart and pick up two, you know, in-home drug screening kits and she did and to come back and ask them to take the test.*[64]

4.2.15. The test strips from each survivor's sample were observed and photographed and they were sent to the vessel manager via text message. [redacted] was negative for all tested drugs. [redacted] test indicated positive for Tetrahydrocannabinol (THC), or marijuana. However, the positive test results and the samples were not sent to an accredited lab as recommended by the manufacturer.

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[62] 46 CFR 4.06-3 discusses the requirements for alcohol testing for Serious Marine Incidents (SMIs) and states that "if safety concerns directly related to the SMI prevent the alcohol testing from being conducted within two hours of the occurrence of the incident, then alcohol testing must be completed as soon as the safety concerns are addressed… alcohol testing is not required to be completed more than 8 hours after the occurrence of the SMI."

[63] [redacted], MBI Hearing Transcript, Pg. 611

[64] [redacted], MBI Hearing Transcript, Pg. 136

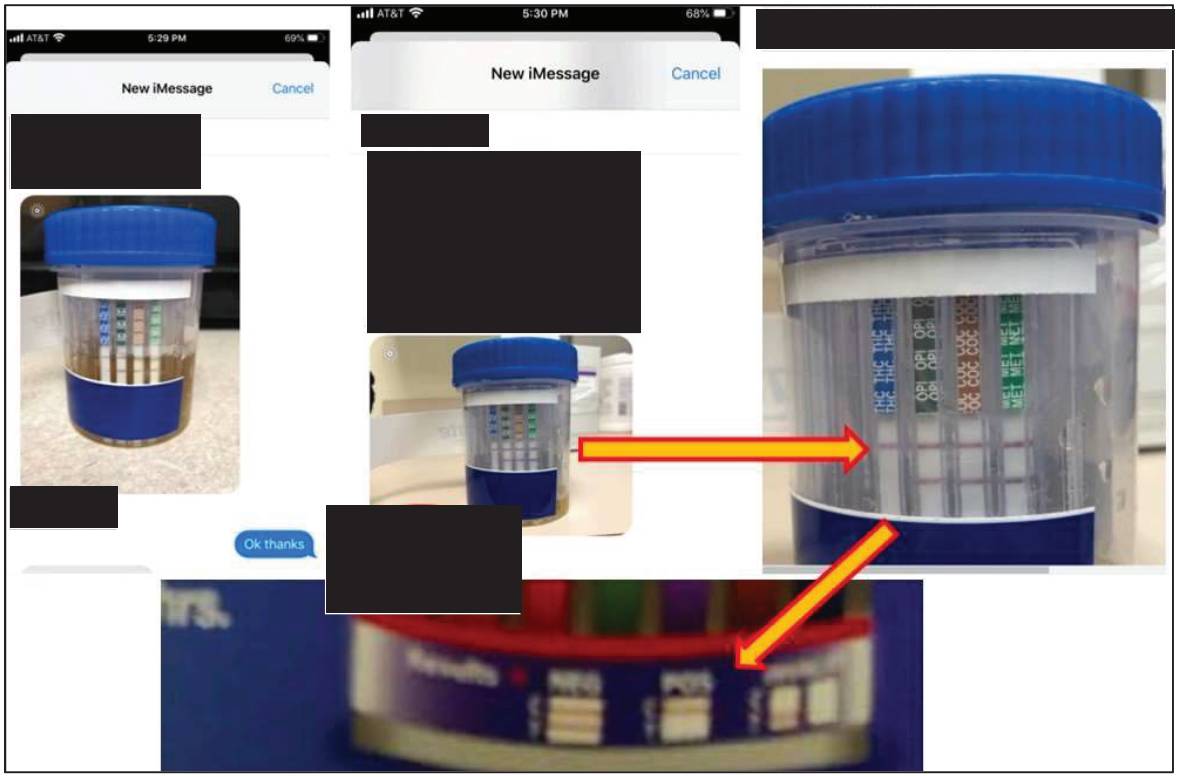

Figure 27 – Results of the post-accident drug test administered to the two survivors. The hospital staff would not drug test the survivors based on hospital protocol. As a result, [redacted] purchased the home test kits upon request of the vessel manager and the crew submitted urine samples, the results were photographed and sent via text message to the vessel manager. The testing was not conducted by a certified lab. (Source: CG Exhibit 080, with markups)

4.2.16. In testimony, the vessel manager talked about the results for [redacted] and the company's attempt to meet drug testing requirements after the accident.

> *Q. ...And are these the tests that were recorded to meet that post-casualty testing requirement?*
> *A. Yes.*
> *Q. Can you tell us what the results of those tests were?*
> *A. [redacted] was negative and [redacted] was positive. For THC.*
> *Q. At what point was that positive test relayed to you?*
> *A. As soon as she got them, she texted them to me.*
> *Q. And were the results ever validated by a certified lab or anything?*
> *A. No.*
> *Q. And so going back to company policy, did this test, line of testing meet company or federal requirements for post-casualty testing?*
> *A. It does not meet federal requirements, no, that's supposed to be a DOT. For us, we do whatever we can knowing that we're in an environment where our hands are a bit tied.*[65]

4.2.17. Post-accident drug testing for the survivors was not carried out under controlled conditions by a certified laboratory and a Medical Review Officer did not verify the results.

[65] [redacted], MBI Hearing Transcript, Pg. 137

Drills and Crew Training Prior to Departure

4.2.18. 46 CFR 28.270—Instruction, drills, and safety orientation—are existing regulations applicable to the SCANDIES ROSE and require that "the master or individual in charge of each vessel must ensure that drills are conducted and instruction is given to each individual on board at least once each month." [redacted] had attended a drill conductor training course at Kodiak, Alaska in 2009 and was certified to perform that function.

4.2.19. Per company policy, the drill conducted on December 30, 2019 was documented on a company-approved form, signed by all crewmembers, and sent via text message to the vessel manager onshore.

4.2.20. During the investigation, both survivors misidentified the location where the EPIRB was located on the SCANDIES ROSE, stating that it was on the starboard side aft of the wheelhouse.

4.2.21. [redacted], the newest member of the crew, was the only one to physically put on the immersion suit as part of the drill and training prior to departure on December 30, 2019.[66]

Company Management

4.2.22. Scandies Rose Fishing Company LLC was the registered owner of the SCANDIES ROSE, and the management operations were based out of Bremerton, WA.

4.2.23. In 2008, the vessel was purchased from [redacted] by the current ownership. Originally, there were seven partners but shares had been bought out over the years. From 2008 to December 2019, the ownership share breakdown had been the same: Mattsen Management LLC – 50.2%, [redacted] – 30%, and [redacted] – 19.8%.

4.2.24. At the time of the accident voyage, [redacted] was in the process of buying [redacted] shares of the SCANDIES ROSE for both himself and his son, [redacted].[67]

4.2.25. [redacted] and the Captain had negotiated and agreed upon terms for the sale of 19.8% ownership held by [redacted] before the SCANDIES ROSE departed Kodiak, AK on December 30, 2019. As the SCANDIES ROSE sailed on the accident voyage, the financial transactions were beginning to take place and [redacted] had sent a down payment check to [redacted] bank. The vessel's sinking meant that the sale of the shares of the minority owner did not take place, but in testimony, [redacted] stated

> *[H]e had already made the loan arrangements with Mountain Pacific Bank. He'd send -- he'd sent the down payment down, and I'd asked him if he wanted to wait until after fishing, and he said no, he wanted to do it immediately*.[68]

[66] [redacted], MBI Hearing Transcript, Pg. 552
[67] [redacted], MBI Hearing Transcript, Pg. 165
[68] [redacted], MBI Hearing Transcript, Pg. 164

4.2.26. [redacted] spoke to both friends and family members about his plans to purchase a larger share in the SCANDIES ROSE and his desire to have more control over purchasing and decision-making.

Said he wanted complete control. He wanted to be able to make all the decisions.[69]

4.2.27. The division of roles and responsibilities for the SCANDIES ROSE was as follows:

4.2.27.1. As the majority owner, [redacted] dealt with the vessel's finances. [redacted] would also give input on fishing strategy and had the final say on major purchases and repairs authorized for the vessel. [redacted] made the final decisions on hiring and employment of vessel captains.

4.2.27.2. The minority owner was not involved in the management or operational decisions of the SCANDIES ROSE. [redacted] bought into the vessel as an investment venture and had not seen the vessel in over two years. As an insurance broker, his company had negotiated the insurance policies for the SCANDIES ROSE as well as many other fishing vessels in the industry.[70]

4.2.27.3. The captain of the vessel oversaw the operation of the vessel and made decisions while the vessel was fishing. Several captains had worked on the vessel. The captain had ultimate authority on when the SCANDIES ROSE would leave port and where the vessel would fish. The captain was in charge of the crew to maintain the vessel and effect repairs on board. The captain was also in charge of selecting and working the crew employed on board the vessel and responsible for their safety. Purchases made by the captain for the vessel were approved through the vessel manager and majority owner.

4.2.27.4. The SCANDIES ROSE's vessel manager was the company's sole shoreside full-time employee. She worked out of Bremerton, WA, and had been in this position for approximately seven years. The vessel manager was responsible for:

4.2.27.4.1. Running prospective crewmembers through the hiring process after the vessel captain had identified them. Typically, the vessel manager verified that an incoming employee's criminal background, medical screening, and drug screening met company policy.

4.2.27.4.2. The purchasing of equipment, parts, and stores for the vessel. All invoices for purchases made for the SCANDIES ROSE would go through the vessel manager.

4.2.27.4.3. Creating and maintaining a "shipyard list" that tracked repair and preventative work that needed to be completed, and parts to be ordered for the vessel's planned shipyard maintenance.

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[69] [redacted], CG Exhibit 132, Pre-Hearing Transcripts, Pg. 270

[70] [redacted], MBI Hearing Transcript, Pg. 160

4.2.27.4.4. Coordinating with third-party companies to facilitate servicing of the vessel's safety equipment and completing any paperwork associated with lifesaving equipment such as registering the EPIRB with NOAA.

4.2.28. Up until the spring of 2019, the company employed a Port Engineer. That person passed away in early 2019 and the position was vacant at the time of the accident. The duties previously held by the person in this position were parsed out amongst the vessel manager and the majority owner but the vessel manager essentially took over most of the port engineer responsibilities despite her lack of marine engineering background. In testimony, the vessel manager described the role and responsibilities

> *Or we have had a port engineer at times, you know… he would be the primary mechanic/engineer who was in my employ, who would guide the surveyor if there was any need to say can you look at this, you know, is there -- we think we might have an issue here.*[71]

The majority owner described the Port Engineer's duties in this manner

> *Well, I think it was hauled out in 2018 because we had to --there was something going on with the generator or the motor and I don't remember because we had -- our port engineer … he really handled those sorts of things.*[72]

4.2.29. With respect to the starboard side overboard chutes, one welding company performed work that was later redone after [redacted] complained to management about leakage into the starboard pipe alley from faulty welds. In testimony, the majority owner was asked about the supervision of that work to ensure the quality of the repairs.

> *Q. Is it typical for Mattsen Management or for the owners of the SCANDIES ROSE to ask for nondestructive testing or essentially for quality assurance work to be done on welding work? Do you have to ask specifically or is that --*
> *A. We do have to ask specifically.*
> *Q. Okay.*
> *A. And unfortunately, and that was a detail that I didn't do.*[73]

Company Drug and Alcohol Policies

4.2.30. The SCANDIES ROSE, as well as other vessels operating under Mattsen Management, followed a specific alcohol and drug use/abuse policy that prohibited the use of drugs or alcohol while onboard the vessel.

4.2.31. Upon securing employment with the company, each crewmember was required to sign a document acknowledging this policy and submit to a pre-employment test. This was typically completed before the crewmember boarded the vessel. [redacted] completed a

[71] [redacted], MBI Hearing Transcript, Pg. 54
[72] [redacted], MBI Hearing Transcript, Pg. 127
[73] [redacted], MBI Hearing Transcript, Pg. 143

pre-employment drug test using a "home use" urinalysis test kit supplied by the vessel's operator after his arrival in Kodiak.[74]

4.2.32. As part of the company policy, the vessel operator or a company representative could require an employee to submit to a random drug test at any time.

4.2.33. Upon being hired, [redacted] had to fill out employment paperwork and was directed to submit to a pre-employment drug test. The test results were certified before he came aboard.

4.2.33.1. This pre-employment drug test submitted on December 23, 2019 was negative for all drugs on the test panel.[75]

4.2.34. The last crewman to join the vessel, [redacted], submitted to a drug the test onboard with a commercially available urinalysis test kit. The Captain sent text messages and photos of the test strip on the sample container to the vessel manager.

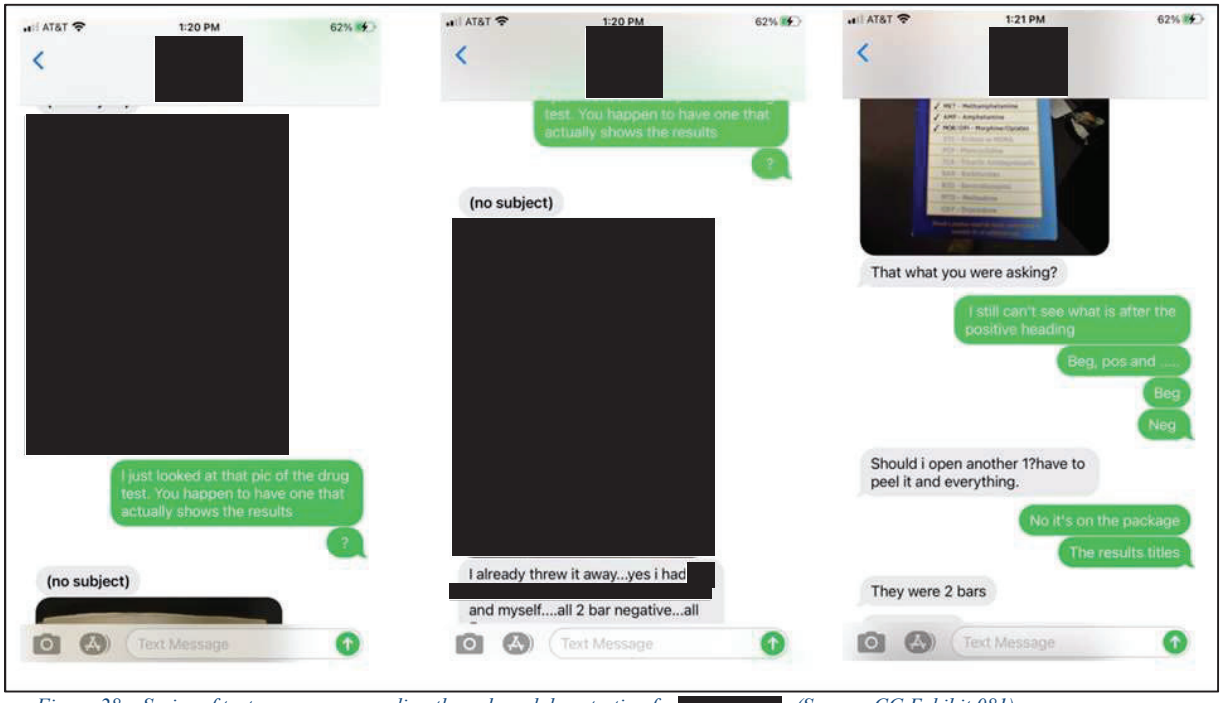


Figure 28 – Series of text messages regarding the onboard drug testing for [redacted]. (Source: CG Exhibit 081)

4.2.35. The Captain of the SCANDIES ROSE texted a picture of [redacted] home test kit results to the vessel manager prior to sailing. The subsequent text string showed that [redacted] was unable verify the results of the test kit and replied "I just looked at that pic of the drug test. You happen to have one that actually shows the results." [redacted] replied "I already threw it away…yes I had [redacted] and myself…all 2 bar negative… all 5." He further went on to say, "Ya i made sure to have witnesses."

[74] [redacted], MBI Hearing Transcript, Pg. 125
[75] [redacted], MBI Hearing Transcript, Pg. 532

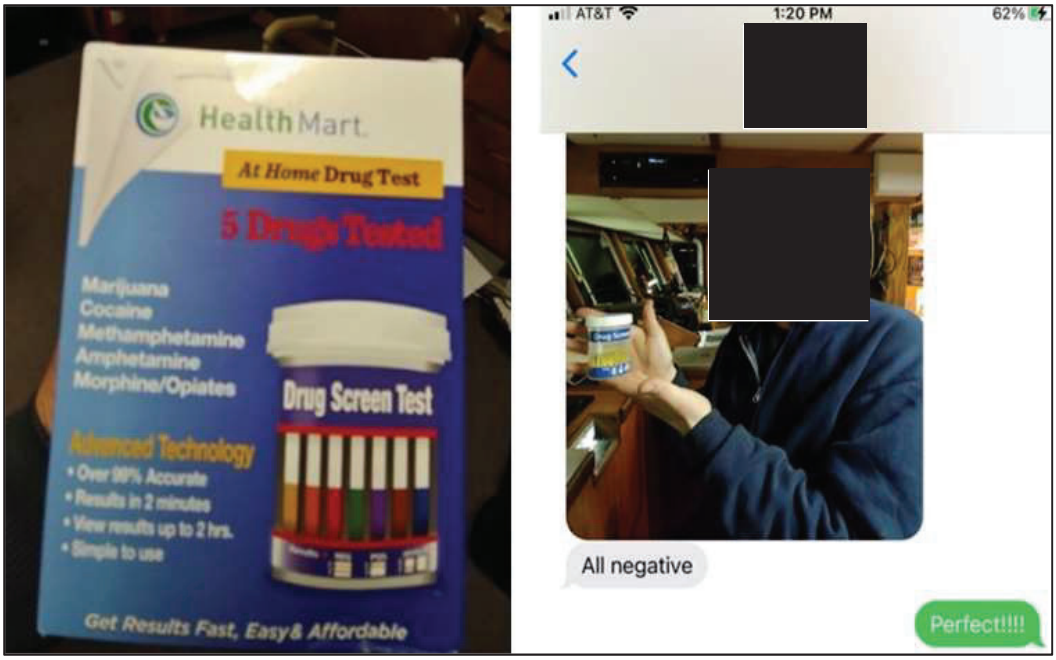


Figure 29 – On the left is the box that contained the home drug test kit used onboard the SCANDIES ROSE to test [redacted]. On the right is a photo of [redacted] holding up the test sample, in this image the results of the tests are not visible. (Source: CG Exhibit 081)

SCANDIES ROSE Operational Management

4.2.36. Prior to being offered employment aboard the SCANDIES ROSE, the Captain would identify prospective crew for the vessel and provide those names to the vessel manager for follow-up.

4.2.36.1. The Captain would sometimes ask other fishing vessel captains for their opinion on a particular person that was under consideration for work on the SCANDIES ROSE for a particular type of operation, such as fishing or tendering. The Captain of the vessel would then refer prospective crew to the vessel manager who would determine suitability and obtain a criminal background check, medical questionnaires, and coordinate pre-employment drug testing. Typically, this was accomplished prior to a crewmember arriving at the vessel.

4.2.36.2. Each crewmember was an independent contractor and signed a contract with Scandies Rose Fishing Company LLC. They each completed paperwork such as consent to release medical records, routing information for funds, drug and alcohol policy acknowledgment forms, sexual harassment policy, and other documents. In addition to other provisions in the employment contract, the contract stipulated the position the crew person would fill and discharge provisions listing conditions for termination. There was a clause on the use and care of the survival suit and the circumstances for drug and alcohol testing.

4.2.36.3. Each of the crew who sailed on the SCANDIES ROSE's accident voyage had a signed employment contract for the Bering Sea cod and opilio crab seasons prior to departure on December 30, 2019. Those contracts also stipulated the shares of the catch in terms of percentages that would be impacted by vessel operating expenses.

4.2.36.4. Shares for the crew translated into the payment that they would receive at the end of the season and varied by position on board. The final pay would be based on the percentage of the total fish caught, minus expenses the vessel accrued during that term or season.[76]

4.2.37. None of the crewpersons aboard the vessel during the accident voyage held or had, at any time, a Coast Guard Merchant Mariner Credential (MMC),[77] nor was such a document required by company policy, state, or federal regulations. This was due to the SCANDIES ROSE being under 200 gross tons (GT). On documented commercial fishing vessels 200 GT or greater which operate beyond the Boundary Line,[78] the master, mate, and engineers must have appropriate Coast Guard credentials for the tonnage, horsepower, etc. of the vessel on which they are serving.

4.2.38. The SCANDIES ROSE crew was composed of the Captain and six additional crew for the accident voyage.

4.2.39. The deck hands' duties onboard included preparing gear for the crabbing and cod fishing, operating equipment to deploy and retrieve crab pots and associated gear, mending and repairing pots and gear, participating in safety drills, and standing navigation watches. For the accident voyage, navigation watches were reportedly one hour shifts.

4.2.40. One crewman acted as the vessel's engineer. He was responsible for the operation and maintenance of mechanical equipment onboard the vessel. The engineer, Mr. [redacted] had worked aboard the SCANDIES ROSE since 2017.

4.2.41. Mr. [redacted] acted as a "deck boss" who, under the direction of Captain [redacted] supervised the work on deck of the vessel, made sure the fishing gear was ready for use, and mustered and supervised the crew when it was time to work on deck.

4.2.42. The SCANDIES ROSE had a permanent Captain and he was in charge on the accident voyage. Crews were assembled based on their previous work on the vessel or identified as potential crewmembers based on other fishing work and they were offered employment for the fishing season.

4.2.43. The SCANDIES ROSE departed Kodiak on the accident voyage with a "pot stack" consisting of approximately 195 combination cod/crab pots.[79] Accounts varied as to the number of pots aboard the vessel, the total number anywhere from between 192 and 198. The stability document dated 2019 indicated that the maximum load of typical 835-pound crab pots would be 208. This loading configuration took up all of the vessel's main deck space. Once loaded on the vessel, the pots were secured with chains running across the top of the

[76] CG Exhibit 017
[77] A MMC is a document issued by the Coast Guard to commercial mariners.
[78] Boundary lines are defined in 46 CFR Part 7. "Seaward" means you are beyond the boundary line and in Near Coastal waters. The "boundary line" is generally a line drawn between the most seaward points of land at the entrances to rivers, harbors, bays, etc. This line will vary by geographic location.
[79] Commonly referred to as "crab pots," combination pots can be used to harvest fish, such as cod.

stack from side to side of the vessel. Tension was applied to the chains with chain binders to secure the load.

4.2.44. The 2019 stability instruction called for 168 pots when all three fish holds were full and, in that case, the forward wing tanks were to be empty.

4.2.45. The pot stack on the SCANDIES ROSE for the accident voyage was **not** configured with alleyways fore and aft on the vessel. Alleyways through the pot stack provide access to the anchor handling equipment, observing ice accumulation forward, and removal of that ice as well as other important vessel functions. Not having these alleyways, the crew would have to go over the top of the pot stack or move forward alongside the vessel's bulwarks if they desired to access the forward part of the vessel.

4.2.46. For the accident voyage, the vessel was loaded so that the pot stack along the vessel's starboard side was one tier of pots lower than the rest of the pot stack. This allowed for a limited segment of visibility forward along the starboard side.

4.2.47. From the wheelhouse, the crew could not see the forward side of the stack of pots. They also could not see the interior of the pots up forward at a distance of approximately 60 ft from the wheelhouse.

4.2.48. Estimates of ice accumulation on the vessel and the pots were made by the crew from the inside the wheelhouse of the vessel. The only bridge windows that could be seen out of were the two directly in front of the starboard helm station which had heating elements installed. The other windows did not have heating elements and were glazed with a coating of ice making it difficult to see out of them. To accurately assess the accumulation of ice on the forward part of the vessel would require leaving the wheelhouse and going forward to accurately observe the accumulation of ice on the vessel and the pots.

Figure 30 – Arrows indicate the general route a crewmember would have to take to climb up to the top of the pot stack and then go forward to do a full assessment of the ice accumulation on the accident voyage. (Source CG Exhibit 014, with markups)

4.2.49. Mr. [redacted] provided the following information regarding his observation of the ice accumulation on the vessel:

Q. Do you know if anybody ever physically went out on the forward decks to look at the ice deck to look at the ice and how bad it was, or were all these observations made from the bridge?
A. From the bridge. Because we didn't have an alleyway or some -- you know, so you'd have to climb over the stack and go down there. And (expletive), now that I'm thinking about it, I (expletive) — I wanted to go up there, but it just was, like, real cold out there. And you know, we were taking (expletive) water over the house, so I didn't want to go out there walking on the pots and then get smacked with a wave and (expletive) be all wet. So in hindsight, I kind of maybe wish I would have.[80]

4.2.50. The SCANDIES ROSE did not place tarps over the stack of pots.

Managing Owner's Duties and Responsibilities

4.2.51. The Scandies Rose Fishing Company LLC managed the vessel and generally handled the payroll, repairs, acquisition of supplies, insurance, fuel and consumables, permitting, manning and other typical vessel management functions.

4.2.52. United States Code (USC) and federal regulations implemented in Title 46 USC §8304 and Title 46 CFR 15.1111 contain a provision which details the requirements for watch standing and balancing the operational needs of a vessel with the need to mitigate the risks associated with fatigue and rest requirements. Based on the characteristics and service of the SCANDIES ROSE, that vessel was exempt from those requirements.

(a) Except as noted in paragraphs (a)(1) and (2) of this section, the regulations in this subpart apply to seagoing vessels as defined in § 10.107 of this subchapter.
(1) The following vessels are exempt from application of the STCW[81] *Convention:*
(i) Fishing vessels as defined in 46 U.S.C. 2101(11)(a).
(ii) Fishing vessels used as fish-tender vessels as defined in 46 U.S.C. 2101(11)(c)……)[82]

4.2.53. The company did not have any written or verbal company policies relating to work hours to reduce the considerable safety risks associated with fatigue. The managing owner left the day-to-day operations of the vessel up to the Captain of the SCANDIES ROSE. In port, prior to departure the crew worked long hours preparing the vessel for sea. This included heavy manual labor such as stacking and securing the pots onboard the vessel. Based on survivor testimony, the Captain of the vessel instituted a watch schedule for the accident voyage that had him standing 6-hour watches and the other five crew persons each standing roughly a one-hour watch and then the rotation would begin again.

[80] Mr. [redacted] CG Exhibit 132, Pre-Hearing Transcript, Pg. 163
[81] "STCW" stands for Standards of Training, Certification and Watchkeeping for Seafarers.
[82] 46 CFR § 15.1101 General

Crew Experience and Familiarity with the SCANDIES ROSE

4.2.54. Captain [redacted] had 45 years of fishing experience, with approximately 40 years of experience as an operator/captain of various fishing vessels in the Gulf of Alaska and the Bering Sea.

4.2.54.1. In 2009, Captain [redacted] assumed the role of the SCANDIES ROSE captain full time. There are instances where other captains took over the operation of the vessel, such as the transit voyage in 2019 from the Seattle area back up to Alaska after the vessel had a shipyard period. However, the majority of the time, Captain [redacted] fished the boat as Captain and was a key decision maker.

4.2.54.2. In February 2009, the Captain attended training and received certification for the Alaska Marine Safety Education Association (AMSEA) Drill Conductor course, with a total 12 hours of instruction. This certification does not expire and regulations require that one person must be onboard with that certification to conduct drills and training for the vessel. This onboard training is intended to familiarize the crew with the vessel's safety equipment and its use prior to departing for sea.

4.2.54.3. The Captain conducted the required training and drills on December 30, 2019 in the evening prior to departure and these drills were described by former crewmembers as "thorough." During the MBI hearing, the following testimony was provided by a former crewmember regarding his observations of Captain [redacted] knowledge and effort with respect to training and drills

> *Q. ...Based on your experience fishing, with regards to drills, what's your experience on the different vessels that you've worked on in regards to drills in donning of immersion suits?*
> *A. As far as information covered versus some of the other boats I've been on, [redacted] was pretty thorough.*[83]

Another more recent crewmember's testimony confirmed that drills were conducted onboard the SCANDIES ROSE

> *A. ...We did safety drills. We'd all meet in the wheelhouse and we did, you know, all -- we all tried on the life suits and we did it until we got it -- our life suits on under a minute. And then we also went over the liferaft, you know, we made sure that we checked all the liferafts. ...And then we also went on what procedures of the radio, whenever there would be an emergency, how we would call out, who would call out, and we also -- there was a -- for each job, there was a kind of a primary and a secondary person of like this person is going to be a guy who does it, but if this guy can't, this person is going to be the one that does it. And there was, for everything from the radio to if someone would go overboard, who would be the person to try to retrieve them and how that would all work.*[84]

[83] Mr. [redacted] MBI Hearing Transcript, Pg. 705
[84] Mr. [redacted] MBI Hearing Transcript, Pg. 730

4.2.54.4. Captain [redacted] was described by many peers in the industry as a "very, very good fisherman." A former crew person explained

> *Well, [redacted] had been around a long time, you know, fishing his whole life… I mean, as far as breaking ice or mechanical things, he was -- [redacted] had a very good feel for that boat I always felt. He knew just how to, how to push her and, you know, when to pull back on the reins, I guess, so to speak.*[85]

4.2.55. Crewmember [redacted] started working on board the SCANDIES ROSE in 2017.

4.2.55.1. Mr. [redacted] was hired as a deckhand as well and, in addition, he was responsible to maintain the vessel's engineering equipment and machinery, transferring fuel, and maintaining the engine room and fuel logs.

4.2.55.2. A former crew person described Mr. [redacted] when testifying

> *Yeah, his experience was -- I mean, he had been fishing for nearly 30 years. [redacted] was a very, very competent deckhand and as well as an engineer…Yeah, he was a solid deckhand, very competent mechanic.*[86]

4.2.56. Crewmember [redacted] was filling the "deck boss" role on the SCANDIES ROSE. He had been commercially fishing for approximately 20 years and had been aboard the SCANDIES ROSE since 2014. As the "deck boss," he was in charge of the general work on deck working under the direct supervision of the Captain.

4.2.56.1. A former crewmember described Mr. [redacted]

> [redacted] *had been fishing a long time also, 20 years, mostly smaller boats. He had fished Dungeness crab off the coast for many years. And he had worked on the New Venture, [redacted] and [redacted] other boats, had fished cod and brown crab on the New Venture prior to coming over and fishing opilios on the SCANDIES ROSE. [redacted] was a solid deckhand, a little goofy, lighthearted, but now it comes from -- that fisherman -- he was a good deckhand*.[87]

4.2.57. Crewmember [redacted] had fished on the vessel for the 2019 king crab (fishery) season and on the accident voyage he was serving as cook and deckhand.

4.2.58. Crewmember [redacted] had approximately 10 years of commercial fishing experience. He had been fishing onboard the SCANDIES ROSE and other fishing vessels with close ties to the vessel for about 8 years.

[85] Mr. [redacted] MBI Hearing Transcript, Pg. 694
[86] Mr. [redacted] MBI Hearing Transcript, Pg. 692
[87] Mr. [redacted] MBI Hearing Transcript, Pg. 692

4.2.59. Mr. [redacted] has approximately 12 years of commercial fishing experience where he had filled several positions including operating a vessel. This was his first experience working onboard the SCANDIES ROSE.

4.2.59.1. Mr. [redacted] in testimony, stated that he had taken an Able Seaman's and/or a course for a 100-ton Master's license at some point but did not complete the process to receive his Coast Guard issued credential. There is no record of a credential or license issued to Mr. [redacted] in the Coast Guard's Marine Information Safety & Law Enforcement (MISLE) database.[88]

4.2.59.2. Prior to commercial crabbing and fishing in Alaska, Mr. [redacted] was employed in the sport fishing industry on charter vessels and on commercial fishing vessels involved in the squid fishery in southern California.

4.2.59.3. Mr. [redacted] experience with fishing in Alaska included drift netting in Bristol Bay, crabbing for red crab, opilio crab, and fishing pot cod.

4.2.59.4. Mr. [redacted] stated the he had attended various types of marine training throughout his career such as advanced firefighting and CPR/first aid. He also testified that he had completed training to prepare him in getting an Able-bodied Seamen (AB) ticket or a 100-ton Master license.

4.2.59.5. Mr. [redacted] had some previous experience sailing on aft house crabbing vessels, having sailed on the F/V WIZARD for one season. He had more experience working on vessels configured with the superstructure or house up forward on the vessel.

4.2.59.6. Mr. [redacted] had previous experience working with Mr. [redacted] prior to their work on the SCANDIES ROSE. Mr. [redacted] and Mr. [redacted] previously sailed on the F/V WESTERN MARINER together.

4.2.59.7. Upon being hired, Mr. [redacted] role was designated as a deckhand. Mr. [redacted] joined the vessel on December 27, 2019, three days prior to departure.

4.2.59.8. Mr. [redacted] approached Captain [redacted] about employment onboard the SCANDIES ROSE for this season.[89] According to the vessel manager, Mr. [redacted] received a recommendation from a previous employer.[90]

4.2.60. Crewmember [redacted] has approximately 20 years of commercial fishing experience.

4.2.60.1. Mr. [redacted] started fishing from the age of 11. He began fishing for crab in 2000.

[88] MISLE is a Coast Guard database for tracking vessel related activities for a range of operations, ranging from vessel exams to law enforcement boardings to involvement with search and rescue incidents.
[89] Mr. [redacted] MBI Hearing Transcript, Pg. 530
[90] Ms. [redacted] MBI Hearing Transcript, Pg. 146

4.2.60.2. Mr. [redacted] has previous experience with trawling, salmon fishing, and salmon tendering.

4.2.60.3. Mr. [redacted] stated that he had some experience working on the F/V PATRICIA LEE, a vessel he noted as a "sister vessel" to the SCANDIES ROSE.

4.2.60.4. Mr. [redacted] joined the vessel on December 29, 2019, the day before departure, and this was his first time working on board the SCANDIES ROSE.[91]

4.2.60.5. Mr. [redacted] indicated that he received a phone call from Mr. [redacted] and was told about the employment opportunity on the SCANDIES ROSE. Captain [redacted] had never previously worked with Mr. [redacted] but he offered him the job on the SCANDIES ROSE for the season.

Watchstanding Arrangements Onboard the SCANDIES ROSE

4.2.61. The Captain set the at-sea watch schedule. On other voyages, there were times where the watch periods for the crew were one and a half hour watches with the engineer excluded from the watch schedule. On the accident voyage, the survivors testified that all crew stood a one-hour watch with the exception of the Captain, who stood a six-hour watch turn.

4.2.61.1. The rotation of the crew was described by survivors as follows: After the Captain, Mr. [redacted] took over, followed by Mr. [redacted] Mr. [redacted] Mr. [redacted] Mr. [redacted] and then Mr. [redacted][92]

4.2.61.2. The two most recent hires, the survivors, were experienced in the operation of commercial fishing vessels from the standpoint of standing a navigational watch at sea. Mr. [redacted] a former member of the crew who left the vessel just before the departure, stated that he had been given some level of training or verbal instruction on what was expected of him while standing watch. That former crewmember stated:

> *Yes. I was briefed essentially on just the, you know, the function of each computer and the GPS and the autopilot and also the radio and the -- just there was, you know, the alarm system that was directly behind, behind you to your left, maybe five feet away, and I was instructed that, you know, if anything would happen to -- if anything would happen then right away to pull that if it was an emergency*.[93]

4.2.61.3. There is no copy of the written standing orders from the Captain for the accident voyage, however, figure 31, below, is a copy of standing orders previously used by Captain [redacted] on the vessel.

[91] Mr. [redacted] CG Exhibit 132, Pre-Hearing Transcript, Pg. 70
[92] CG Exhibit 132, Combined Pre-Hearing Transcript, Pg. 161
[93] Mr. [redacted] MBI Hearing Transcript, Pg. 713

Scandies Rose Standing orders

1) Stay awake and alert
2) No reading or listening to music
3) Know your position at all times
4) Wake the Captain if you are unsure about anything pertaining to your watch
5) Watch the radar; wake the Captain if a vessel comes within _____miles of us.
6) Check engine room every hour

Figure 31 – Image of document provided as an example of a typical set of Standing Orders for the SCANDIES ROSE. This was a version used from a previous voyage on an undetermined date. (Source CG Exhibit 019)

4.2.61.4. Typically, nearing the completion of a navigational watch, crewmembers would use the house phone to call the stateroom of the next person scheduled for watch to alert them that it was time for watch relief. Once the relief had been briefed, the off watch crew would be required to conduct a round of the engine room to make sure that there were no obvious problems such as flooding, leaking oil, or any other problems in that space. After that, the crew could occupy their time as they saw fit during the trip.

Vessel Layout

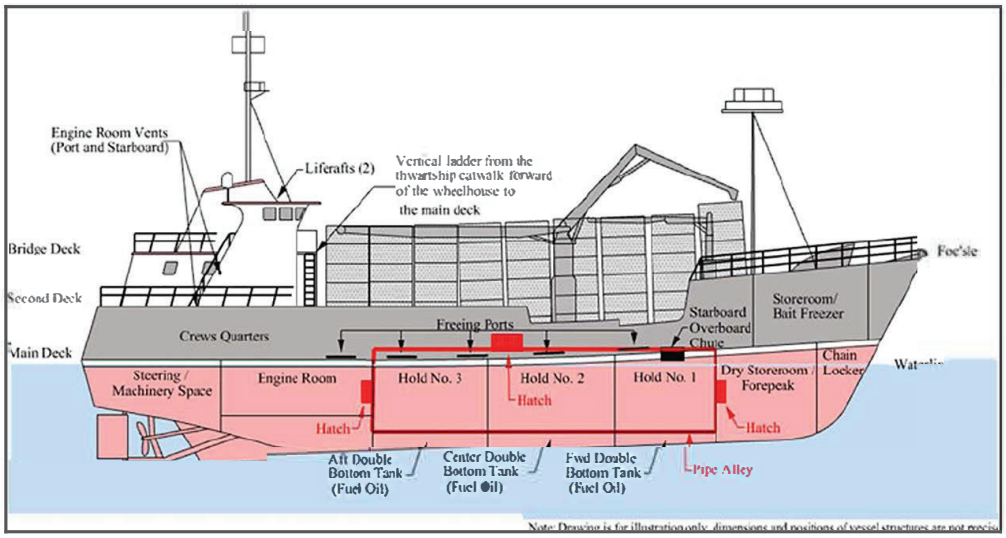


Figure 32 – This is the starboard outboard profile of the SCANDIES ROSE with key features of the vessel identified. The large pipe alley running down the starboard side and its associated components are shown in red for clarity. There is another pipe alley on the other side of the vessel. (Source Coast Guard)

Vessel History, Maintenance, & Material Condition

4.2.62. On October 13, 1978, the F/V ENTERPRISE was delivered by Bender Shipbuilding in Mobile, AL. The 116.6 foot, 195 GT vessel was constructed of 3/8-inch steel hull plate as hull number #47.

4.2.63. In the 1980s, the vessel experienced a fire. There is no documentation of this in the Coast Guard's MISLE database, but the Condition and Valuation Survey lists this event in

the vessel repair or modification history section and that document reports that the vessel's superstructure was rebuilt.[94]

4.2.64. In 1988, arrangements were made for a stability assessment for the vessel and calculations were done by a Naval Architect, Professional Engineer (PE) Mr. [redacted] The Naval Architect conducted the stability assessment and the vessel was issued its first SCANDIES ROSE stability instruction. The stability instruction indicated that the inclined stability test was conducted in Seattle, WA on August 28, 1988.

4.2.65. The general description section of the 2019 Condition and Valuation Survey describes a modification that took place in 1995; however, the history section of repairs of the same report does not contain any amplifying data on that modification. There is no documentation of these modifications to the vessel in the Coast Guard's MISLE database.

4.2.66. Existing regulations did not require fishing vessels like the SCANDIES ROSE to conduct any kind of hull testing to identify hull wastage or thinning on the vessel's steel hull.

> 4.2.66.1. In April 2003, limited audio gauging was carried out by the same surveyor who conducted the Condition and Valuation Surveys in order to determine the hull's thickness. The audio gauging testing was done in ninety-seven places in the hull. The surveyor stated in the valuation and condition reports, that "based on the results of the gauging, the hull is in very good condition."[95]

4.2.67. In 2010, the sewage tank at the starboard stern of the vessel was replaced. The external hull plating that made up a portion of the sewage holding tank was replaced after the tank was fitted inside the hull. The sewage tank design was changed and converted to an independent internal tank that did not share any external portions of the SCANDIES ROSE's hull.

4.2.68. In 2012, audio gauging was conducted in the vessel's three double-bottom fuel tanks. Some pitting was found in the after tank and repaired by filling the pits with weld material.[96]

4.2.69. According to the Marine Surveyor who conducted a significant number of the vessel's surveys, the reason he stopped measuring the hull's thickness (audio gauging) was because he "decided he was just getting too old for this stuff" as this type of work required spending time on his back in wet conditions under the vessel in dry dock.[97]

4.2.70. Hull repairs were made to the vessel's two starboard waste chutes in mid- to late-April 2019 by Aztec Welding, which included closing off the after waste chute on the starboard side. Figure 35, below, shows communication from the Captain to the vessel manager indicating that the crew identified leakage in the void space during the previous

[94] CG Exhibit 004
[95] CG Exhibit 004, Pg. 38
[96] CG Exhibit 004, Pg. 38
[97] Captain [redacted] MBI Hearing Transcript, Pg. 305

winter (presumably during the 2018/2019 fishery). The crew mitigated this water intrusion by applying a large amount commercial underwater epoxy to the leaking welds in an attempt to stop the leaks.[98]

4.2.71. At the time of the sinking, the SCANDIES ROSE had two active waste chutes, one on the port side and one on the starboard side. The two steel chutes were used to discharge by-catch or other unwanted material brought onboard while fishing. The chutes ran from the main deck, down through the pipe alley voids on either side of the vessel and then passed thru the side of the hull, slightly above the waterline. When the vessel was underway or fishing, these chutes would be exposed to constant wave action and the corrosive effects of the salt water. During the period between April 15 and April 26, 2019, the starboard fore and aft chutes were attended to while the SCANDIES ROSE was at the dock while in the Seattle, WA area. The starboard side forward chute was repaired with "doublers"[99] and the aft chute was closed off. This work was performed by Aztec Marine LLC, a commercial welding contractor, who was hired to weld steel plate over sections of deteriorated steel that made up the chutes. The welders who performed the work were not certified marine welders.

Figure 33 - Starboard side of the SCANDIES ROSE prior to the repair of the overboard chutes, taken several years earlier. Yellow circles indicate two chutes, one forward and one aft through the side shell plating and into the starboard pipe alley. (Source Mr. [redacted] ©, with permission and with Coast Guard mark up)

Figure 34 – SCANDIES ROSE on the blocks May 2019 at Lovric's Shipyard, Anacortes, WA. "Starboard Waste Chute" highlighted, inset photo, lower right, displays the completely rebuilt starboard waste chute as repaired later in 2019 by High Mark Marine certified welders. (Source [redacted], with Coast Guard mark up)

[98] Captain [redacted] MBI Hearing Testimony, Pg. 1924

[99] Doubler plates are used as one of the solutions for plate damage from corrosion in the structures of the ships. Doubler plates are also called "doublers." This method is one method for repairing the structure of ships as it is less costly and relatively easy compared to inserting a permanent welded plate.

4.2.72. The repairs were completed as per the invoice on April 26, 2019. At some point after the repair was completed and while the vessel was engaged in fishing operations, the crew on board the SCANDIES ROSE discovered that the welds from the starboard waste chute repair had failed and an undetermined amount of seawater was leaking into the starboard pipe void. The Captain sent images and text messages of the leaking areas and his concerns to the vessel manager ashore and asked her to get arrangements made to repair this issue.

Figure 35 – Composite of text messages sent ashore by the Captain of the SCANDIES ROSE in mid-2019 detailing the leaks and temporary repairs with a chemical sealing compound. The crew also had to pump out seawater that had leaked through the porous welds from the pipe alley that ran the length of the tanks on the starboard side of the vessel. (Source CG Exhibit 112)

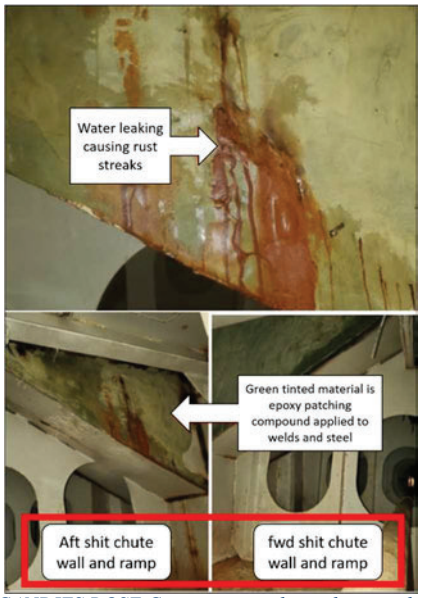


Figure 36 – Composite of the photos the SCANDIES ROSE Captain sent ashore showing the size and extent of the leakage and the areas where temporary repairs were made with a product called, "Splash Zone"®. Comments within the red box are vessel Captain's comments, boxes with arrows are Coast Guard mark ups (Source CG Exhibit 112, with mark ups)

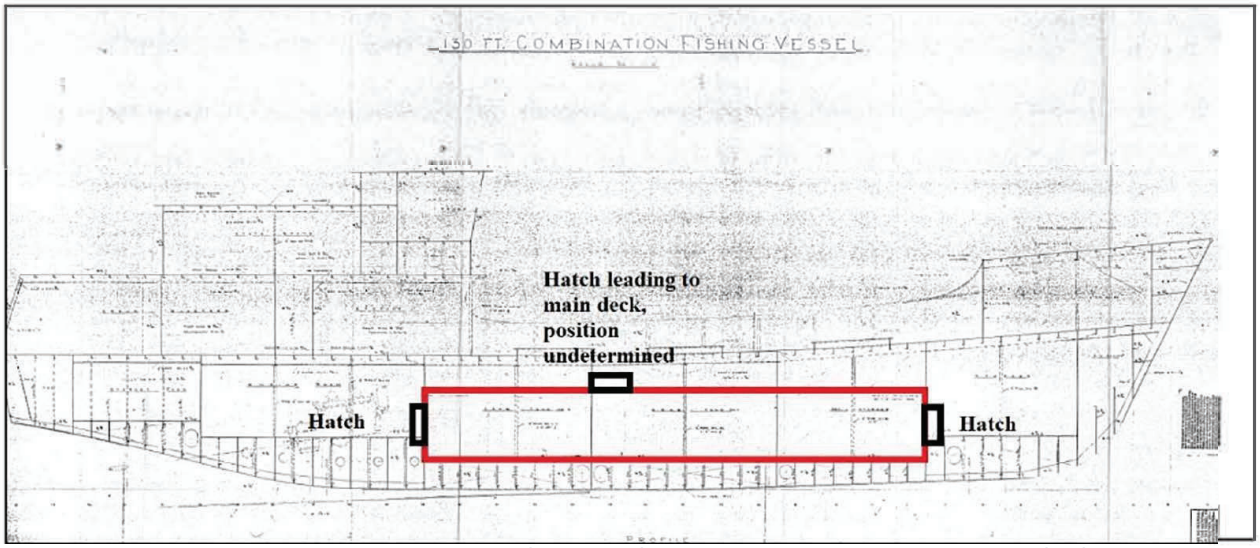


Figure 37 – Approximate position of the pipe alleys that ran down each side of the vessel. There were hatches on each end and there was also one hatch in the top of the pipe alley that was able to vertically access the main deck. Position of that hatch is not precise. (Source CG Exhibit 005, with markups)

4.2.73. Between April 27 and June 6, 2019, Captain [redacted] a Marine Surveyor from Fishermen's Maritime Services, Inc., conducted a Survey on SCANDIES ROSE, and found the vessel to be in apparent good order, in sound condition and suitable for the intended service as a fishing vessel. This survey was carried out over the course of five visits while the SCANDIES ROSE was dockside and hauled out of the water. The items listed below in italics are directly quoted from the 2019 Condition and Valuation Survey.

4.2.73.1. *The vessel was licensed to fish in the Bering Sea for king crab, opilio crab, and Pacific cod using regular rectangular shaped, rigid-steel mesh cages, known as pots. In the summer months, the vessel would act as a tendering vessel for the salmon fishery in the Gulf of Alaska.*[100]

4.2.73.2. *The vessel was fitted with 10 integral fuel tanks that had a total fuel carrying capacity of 60,832 gallons. Additionally, the vessel had an integral tank for hydraulic oil with a capacity of 720 gallons and an integral tank to carry 1,200 gallons of lubricating oil.*

4.2.73.3. *The SCANDIES ROSE had two 12-cylinder Detroit Diesel 805-hp prime movers. The turbocharged engines were coupled to reduction gears and 6-inch stainless steel shafts. The shafts ran out through the stern tubes and were connected to two 4-bladed, fixed pitch propellers. Steering of the vessel was accomplished by twin rudders, powered by hydraulic rams.*

4.2.73.4. *The vessel had two Detroit Diesel electric generator packages supplied the vessel with alternating current power. The diesel engine prime movers were also coupled*

[100] A fish tendering vessel moves commercial supplies, stores, refrigerates, or transports fish to or from a fishing, fish processing, or fish tender vessel or a fish processing facility.

to hydraulic pumps, which supplied the vessel's hydraulic consumers. The two deck cranes had self-contained hydraulic power packs.

4.2.73.5. *The SCANDIES ROSE was constructed of a steel hull with a steel house. Both the hull and deck plating was comprised of 3/8-inch mild steel. The bow plating to the hull was 5/8-inch and 1/2-inch mild steel plate. The hull bottom was nearly flat, with a dead rise of two feet and vertical sides. The bow was raked and there was a transom stern, a single hard chine and a single centerline skeg*.[101]

4.2.73.6. *The vessel's fully enclosed forepeak housed the bait freezer on the port side and a workshop on the starboard side. Aft was the fishing deck, which had an elevated hardwood wear deck. Further aft was the deckhouse that had fishing machinery, equipment, and a deck crane on the port and starboard sides.*

4.2.73.7. *The main deck level was full width and housed a galley, electrical equipment room, and accommodations for the crew. The second deck, above the main deck, was a partial-width deckhouse with accommodations and utility spaces.*

4.2.73.8. *Weather galleries were aft, with access ladderways port and starboard leading up. Underneath these ladders were engine room vents. The third deck was also partial width and housed the navigational bridge forward and an open weather deck aft. The bridge had three maneuvering stations (port, starboard and center), with the main station positioned all the way starboard.*

4.2.73.9. *The starboard operating station was forward facing and the surrounding windows were equipped with heaters to melt away accumulated ice. The operating station was equipped with radars, navigation and positioning equipment, maneuvering controls, communication equipment, weather monitoring equipment, and machinery monitoring gauges and alarm panels. The alarms panels on the bridge would alert the operator of abnormal operation of the vessel's equipment. A general alarm bell and actuation lever were also located near the starboard-side control station. Atop the navigation bridge, deck lights, radars, and communication equipment antennas were mounted.*

4.2.74. Upon returning to the dock after the king crab season, the owner had agreed with the repairs to the waste chute and another welding contractor, Highmark Marine, was hired to assess the issue of the leaking starboard waste chute and make repairs.

4.2.75. The repair work was undertaken and completed in late November 2019, with an invoice date of November 22, 2019.[102] The new welding contractor cut out the existing starboard waste chute and rebuilt it using 3/8" steel plate. The ABS-certified welder who conducted the welding work used a dye penetrant to inspect his welds after completion.

[101] A chine is the seam in a boat's hull where the bottom and side pieces of sheet material meet. A skeg is a keel projection designed to protect the propeller and support the rudder.
[102] CG Exhibit 007

Using a dye penetrant is one form of non-destructive testing. All welds passed inspection, and the work was completed before the SCANDIES ROSE departed.

4.2.76. The engine room and forepeak were equipped with float-type bilge alarms that would alarm locally and on the bridge when activated by the rising of water in the vessel's bilge.

4.2.77. The fish holds were not equipped with "slack" tank alarms that would sound on the bridge if the tanks were not full or empty. The majority owner told investigators that it is common industry practice to continually take a suction on the tank if trying to keep a crab tank empty.

4.2.78. In the 2019 SCANDIES ROSE Condition and Valuation Survey, the Surveyor, Captain [redacted] commented that the vessel was "well-kept and maintained" and that the construction of the SCANDIES ROSE was "extraordinary" for a vessel of her era. The survey included a list of maintenance completed during annual and bi-annual dry-docking periods, for a period of over 20 years. Items such as main engine overhauls, communication equipment renewal, refrigeration equipment maintenance, and other vessel systems were documented in the history.

4.2.79. A SCANDIES ROSE former crewmember spoke of the vessel's seaworthiness

> *It appears to me that in that summary you told the Coast Guard that the SCANDIES ROSE was like a battleship, and you loved that boat, and you described it as a Cadillac. Is that still how you feel about the SCANDIES ROSE?*
> *A. Yes, sir. That was incredible platform.* [103]

Another former crewmember stated

> *It's a nice big boat. You kind of don't think of a big boat going down. You kind of get the idea that they're, you know, indestructible when you look at these little guys and you're like, you know, I'm glad I'm on this big guy. So yeah, I kind of -- I felt safe on that boat most definitely.*[104]

4.2.80. The hull below the water line was divided transversely into six watertight compartments. A ballast tank is at the stem, going aft is a chain locker and then further aft is the dry stores. Next aft are three flooded raw water tanks arranged along the centerline. Pipe alleys port and starboard were fitted with ventilation fans and accessible through hatches in the engine room and through the forepeak. The fuel tanks were outboard along the sides of the hull. The vessel had double bottom fuel tanks. The machinery space included main and auxiliary engines, systems machinery spaces, and steering equipment in the aft part of the vessel.

[103] Mr. [redacted] MBI Hearing Transcript, Pg. 702
[104] Mr. [redacted] MBI Hearing Transcript, Pg. 734

4.2.81. The hatches at the end of the pipe alley or voids were bolt-on types, not designed to be easily opened, and required a wrench to loosen the bolts to remove the hatch from the studs to gain access to the void.

4.2.82. Existing regulations did not require the SCANDIES ROSE to adhere to a dry-docking inspection schedule, but the vessel owners set their own schedule and would haul the SCANDIES ROSE out of the water roughly every two years. In testimony, the managing owner was asked about the vessel's maintenance and dry dock schedule

> *Q. ...So then in the last 18 months, to the best of your recollection, how many -- how many dry-dock or dockside periods did the SCANDIES ROSE have?*
> *A. I think just one, I think just the one that -- we usually haul out -- we usually haul out every 2 years and -- but bring the boat south every year, so the boat always comes down for a maintenance period, but I think we only haul out every 2 years.*[105]

During this biennial event, the vessel's sacrificial zincs would be replaced, and the hull would be stripped, visually inspected, and repainted.[106]

4.2.83. In 2019, the SCANDIES ROSE underwent a dry dock period at. Lovric's Sea Craft Inc., in Anacortes, WA. The vessel was hauled out on May 9 through May 26, 2019 and the invoice for the work was dated May 28, 2019.[107]

> 4.2.83.1. During this dry dock period, Captain [redacted] the vessel's primary captain, was not present at the shipyard. During Captain [redacted] absence, Captain [redacted] the majority owner, oversaw completion of the established worklist.

4.2.84. After the shipyard period was complete, the SCANDIES ROSE departed the Seattle area and returned to Alaska. It then participated in the king crab fishery in the Bering Sea, which had opened October 15, 2019. The crew of the SCANDIES ROSE completed crabbing operations and then returned to Kodiak, AK on November 2, 2019 where the vessel stayed at the dock for the remainder of the year.

4.2.85. A decision was made to bring the vessel and a full load of pots to Kodiak, AK instead of Dutch Harbor, AK. This was done as the Captain wanted to make repairs on some of the crab pots while in port and because of continued logistical difficulties in getting crew on and off at Dutch Harbor due to an issue with the airport runway and the frequent inclement weather at that end of the Aleutian Island chain.

Vessel Communication Capabilities

4.2.86. The SCANDIES ROSE was outfitted with the communications capabilities listed in the figure below. There were a number of ways that the crew could have utilized this

[105] Captain [redacted] MBI Hearing Transcript, Pg. 47
[106] A sacrificial zinc is a type of galvanic anode designed to be attached to the submerged surface of the vessel's hull and to corrode instead of the steel hull of the vessel corroding.
[107] CG Exhibit 111

equipment to receive weather information or contact other vessels or the Coast Guard in the event of an emergency.

SCANDIES ROSE Communications Equipment	
Type	**Investigator Comments**
SSB High Freq. Radio: Skanti 8000	Potentially the radio used in broadcasting the HF 4125 kHz mayday call
SSB High Freq. Radio: SEA 222	Potentially the radio used in broadcasting the HF 4125 kHz mayday call
VHF Radio: Icom, model IC-M504	This model is capable of Digital Select Calling which can send position data to nearby vessels or stations when the distress button is pressed when properly configured
VHF Radio: Standard, model HX 250 portable VHF FM transceiver	
Simrad Model RS 35 VHF receiver with a remote communicator for use in the tendering booth.	This enables greater range of vessel-to-vessel communication than a handheld VHF from the tendering booth. (Note contained in CG Exhibit 004))
2-meter Radio: Yaesu, model FT 2600	
Saturn M Satellite communications system with distress signal sender	Typical installation includes distress signal sending Indications are that this system, though installed was no longer supported.
Sailor, Iridium Satellite Communications System	
Mitsubishi Trac/Tag Phone	
Satellite Communications Unit: SeaSat 3 C 6003 standard C with Hitachi laptop computer	
KVH, Mini-VSAT Satellite Communications system	
CLS "Thorium" VMS Transmitter with broadband email service	
Satellite TAG Phone in the Captain's stateroom for emergency calls	
Inno Media Modem with D-Link DES 1008pA switch	
Two (2) V-Tech Telephones	
One (1) Dial Pad "Plus" Telephone dialer	

Figure 38 – Table showing the communications equipment onboard the SCANDIES ROSE at the time of the accident, compiled from the 2019 Condition and Valuation Survey. (Source Coast Guard)

4.2.87. At least one of the SCANDIES ROSE wheelhouse VHF marine radios had the capability of having the Digital Selective Calling (DSC) feature available.

Weather Equipment Aboard the Vessel

4.2.88. The vessel was equipped with the typical kind and types of weather equipment for a commercial fishing vessel operating in Alaskan waters. The internet was accessible for weather information and detailed weather forecasts when at the pier and within limited distances from shore. In addition, the crew relied on weather applications on wireless devices like cell phones. One such supplication that was used was the "Windy® App." In testimony, a deckhand described how the use of this weather application was widely used in the fishing community and how knowledge gathered using this application impacted decisions on the vessel

And then just kind of making everything tight because we knew the weather was going to be bad. I mean, we -- everybody has a Windy app. We knew it was going to [be] like purple, so yeah, we knew it was going to be shitty. So we just made sure everything was tight.[108]

4.2.89. The table below lists the weather equipment aboard the SCANDIES ROSE.

SCANDIES ROSE Weather Equipment	
Type	Significant Details
Furuno, DFAX model Fax-207 weather fax receiver	
Barometer: Seth Thomas	
Tide Finder tide calculation computer	
Telcor, series 520D anemometer	Measured wind speed in knots, does not measure wind direction
Cell Phone Application "Windy.Com"	Wireless device-based application with user friendly images of wind direction and intensity, sea heights and other information. Carried on vessel's crew phones or available from the internet.
SCANDIES ROSE VHF Radios to monitor marine weather broadcasts made by the National Weather Service	

Figure 39 – Table with a listing of the equipment that was aboard the SCANDIES ROSE that would have been available for weather monitoring. Based on the equipment listed in the 2019 Condition and Valuation Survey. (Source Coast Guard)

Figure 40 – Wind speed indicator with controller mounted on the upper part of the after-wheelhouse bulkhead of the SCANDIES ROSE that indicate apparent wind speed in knots. The device does not measure wind direction. Also shown in the bottom right of the right picture is the weatherfax, another means to receive weather information. (Source Captain [redacted] Survey Photos)

4.2.90. Mr. [redacted] a survivor, recounted that he listened to the NWS weather forecasts on the marine VHF radio on his respective watches and prior to leaving port. While waiting for the tide for Whale Pass, Mr. [redacted] stated

Then it was taking my watch, listening to the radio, channel 16 for you folks and put the weather channel once in a while.[109]

[108] Mr. [redacted] MBI Hearing Transcript, Pg. 1051
[109] Mr. [redacted] MBI Hearing Transcript, Pg. 558

Lifesaving Equipment

4.2.91. At the time of the last Safety Compliance Check conducted in October 2019, the SCANDIES ROSE complied with the lifesaving equipment requirements contained in 46 CFR 28.105 – Lifesaving equipment, general requirements.

4.2.92. The SCANDIES ROSE was outfitted with the lifesaving equipment listed in the figure below.

SCANDIES ROSE Lifesaving Equipment		
Type	Amount	Details
Personal Floatation Devices (Life Jackets)	Unknown	Not listed in Condition and Valuation Report (CG Exhibit 004) or in CG Safety Compliance Checks (CG Exhibit 034)
Liferings	6	Placed around vessel
Immersion or Survival Suits	10	4 Adult Universal, 3 Jumbo, 1 Intermediate (Wheelhouse) and 2 Adult Universal in Captain's cabin
Flares	12	Various Types
Inflatable Liferaft	2 (8 Person)	Located on top of the wheelhouse on either side of vessel
Gear pack for Liferafts	-	SOLAS A
Liferaft Hydrostatic Release Expiration Dates	-	June and October 2020
Liferaft, Inspection Dates	-	17 April 2019 – 28 Nov 2019
EPIRB	1	ACR "Global Fix" Model V4 406
EPIRB Bracket Hydrostatic Device Expiration	1	November 2021
EPIRB Battery Expiration Date	-	Nov 2027
EPIRB Registered with NOAA	-	Yes
EPIRB ID	-	2DCD8760D0FFBFF

Figure 41 – Significant lifesaving equipment carried onboard the SCANDIES ROSE at the time of her accident voyage. (Source Coast Guard)

Immersion Suits

4.2.93. Immersion suits, also called exposure or survival suits, are buoyant waterproof thermal suits designed to protect the wearer from hypothermia after abandoning a vessel, especially in colder waters. The immersion suits on the SCANDIES ROSE were equipped with a whistle, strobe light, reflective material, and a high rider ring to provide increased buoyancy for the wearer's upper body. The suits were stored in a cabinet in the wheelhouse and there were two located in the Captain's cabin as stated in the Condition and Valuation Survey dated 2019.[110] In discussing the pre-departure training and drills, the witnesses testified that there were no issues relating to the location, composition, or storage of the suits.

4.2.94. The company that owned the SCANDIES ROSE provided the immersion suits for the crew and the crew person signed a contract which contained the following provisions:

[110] CG Exhibit 004

Survival Suit/Safety Equipment. Owner will provide a survival suit to Crew Member for use during this agreement. Crew Member shall maintain the survival suit in good condition and advise Owner or Skipper immediately regarding any problems with the condition of the survival suit or its fit. Crew Member shall participate in all meetings and drills concerning use and location of the survival suit and the safety equipment aboard the Vessel. The Skipper may require Crew Member to wear certain safety gear during fishing operations, including flotation devices and safety headgear. Crew Member shall wear the required safety gear.[111]

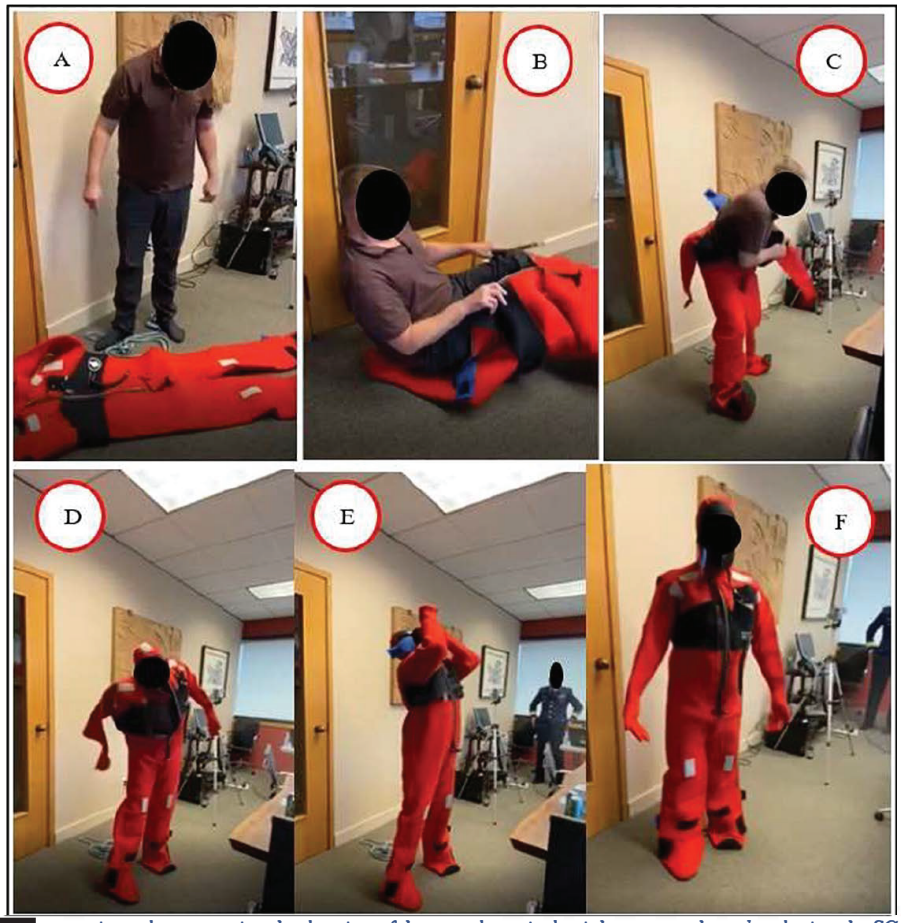


Figure 42 – Mr. [redacted] a survivor, demonstrating the donning of the actual survival suit he put on when abandoning the SCANDIES ROSE. Sequence starts at A and end at F with the suit properly worn but without the inflatable bladder inflated. The inflated bladder puts the wearer in a more upright position in the water. (Source CG Exhibit 102, still images from the video)

Emergency Position Indicating Radio Beacon (EPIRB)

4.2.95. The SCANDIES ROSE was equipped with a "Type I" ACR "Global Fix" model V4 406 EPIRB. The EPIRB onboard the SCANDIES ROSE was properly registered and the registration data was stored in the NOAA database. This data included shore side contacts and other critical information about the SCANDIES ROSE to assist rescue forces.

[111] CG Exhibit 017

4.2.95.1. On or about October 2017, the company purchased and then registered a new EPIRB for the SCANDIES ROSE.

4.2.95.2. NOAA's EPIRB registration site indicates that on August 17, 2019, the vessel's beacon registration was updated. The internal EPIRB battery was listed as valid until 2027.[112]

4.2.95.3. An EPIRB is a float-free, automatically activated device detectable by satellite anywhere in the world. The device emits a 406-Megahertz (MHz) distress signal containing a unique identification code that can be used to reference information about the carrying vessel, including its name, type of survival gear, and emergency points of contact ashore. Encoded in that signal is geographic positional information from an internal global positioning system (GPS) navigation device where the distress position is sent to rescue forces. The device is also equipped with a homing signal, 121.5 Hz to allow rescue forces to home in on the position of the EPIRB during the search.

Figure 43 – To the right is an EPIRB of the type and manufacture that was carried on the SCANDIES ROSE. The EPIRB on the SCANDIES ROSE did not transmit a signal received by rescue forces and the storage bracket was empty when the ROV inspected the wreckage. On the left is one type of personal locator beacon for size comparison. (Source Coast Guard Auxiliary Photo)

4.2.96. Mounted on the inward side of a handrail aft of the wheelhouse on the port side, the SCANDIES ROSE's EPIRB was mounted clear of obstructions and it was designed to float free and activate automatically if the vessel sank. The EPIRB could also be manually activated in an emergency by removing it from the bracket and sliding the clear cover from left to right to break the witness seal and pressing the red activation button for one second. It was housed inside a special bracket and protected from the elements. The bracket was equipped with a hydrostatic release mechanism similar to what was used on the vessel's liferafts. Between approximately 5 and 13 feet underwater, the release mechanism would activate, allowing the bracket's cover to open and the EPIRB to float free. Water activation sensors on the front of the EPIRB would automatically activate the device when wet with water.

[112] CG Exhibit 034

Figure 44 – Composite of photomontage of the SCANDIES ROSE EPIRB. Top left, EPIRB in housing on the inside of top rail aft of the wheelhouse. Top, right is the location shown with the yellow arrow in reference to the position in relationship to the port wheelhouse door. Bottom left, the open EPIRB housing during inspection for 2019 Valuation and Condition Survey. Bottom right, the empty housing as seen during underwater ROV site survey February 2020. (Source – [redacted] photos for 2019 Valuation Survey and bottom right, CG Exhibit 008)

4.2.97. The hydrostatic release was required to be renewed every two years.

4.2.98. During the October 11, 2019 Safety Compliance Check exam conducted by the Coast Guard, it was noted by the Coast Guard that the EPIRB hydrostatic releasing mechanism was due to expire that same month.[113] An invoice shows a new hydrostatic device was purchased in Dutch Harbor, AK on or about October 16, 2019.[114]

4.2.99. The expiration date for the EPIRB's hydrostatic release mechanism listed on the "Monthly Emergency Test and Check Log For: F/V Scandies Rose," which was completed

[113] CG Exhibit 034
[114] CG Exhibit 010, Pg. 24

prior to departure, was October 2022. The Marine Board was unable to determine why this entry differed from the information in figure 41 which listed all the lifesaving equipment.

4.2.100. Regulations under 46 CFR 25.26-50(b) require that the EPIRB be tested once a month but do not require this test to be logged. There is no company record of EPIRB tests being conducted.

4.2.101. In the vessel's June 2019 Condition and Valuation Survey, the EPIRB is pictured on the port side, mounted on handrails aft of the portside wheelhouse door on the wheelhouse deck. In recounting testimony about the EPIRB and their familiarization with that device, both survivors incorrectly stated that it was mounted on the stern on the starboard side of the vessel

> *Yeah, it was, it was on the stern on the, the handrail there behind the starboard side, I believe.*
> *Q. Okay. So --*
> *A. Down, down the stairs I believe it was. I'm trying to remember right, and so -- I only saw it that one quick moment, but I'm -- if my memory serves me correctly, it was, yeah, just, just behind the, the starboard side.*[115]

And

> *Q. Okay. And then you mentioned the EPIRB was on the other side. Can you tell us to port or starboard where they – where your recollection of the EPIRB being located?*
> *A. It's on the starboard side right outside the wheelhouse door, right on the -- there's like a -- bars and stuff there just had it up on the -- so right on the -- right as you walk out the door on the service side, the captain's door.*[116]

4.2.102. Neither of the surviving crew saw the EPIRB while abandoning the vessel.

4.2.103. ACR Electronics, the manufacturer of the EPIRB, indicated that the fresh battery will transmit for 48 hours at -4° Fahrenheit and that the unit can be submerged in water up to 5 minutes and depths of 33 feet although the unit is designed to float free and operate on the sea's surface with the antenna pointed up. This provides a clear transmission path to satellites and the homing signal. At night, the EPIRB also has a 4-LED strobe light array to assist in location of the persons awaiting rescue assistance.

Visual Signaling Devices Aboard the Vessel

4.2.104. The Condition and Valuation Survey report completed in 2019 indicated that the SCANDIES ROSE had a box of distress flares located in a cabinet in the wheelhouse. The flares were within their expiration date and were serviceable. That flare kit located in an orange waterproof box in the wheelhouse contained:

> *Six (6) Pains-Wessex red hand held flares*

[115] Mr. [redacted] MBI Hearing Transcript, Pg. 553
[116] Mr. [redacted] MBI Hearing Transcript, Pg.1074

Three (3) Pains-Wessex red parachute flares
Three (3) Pains-Wessex orange smoke canisters
One (1) red flag

Liferaft Stowage, Usage, and Visual Signaling Devices

4.2.105. The SCANDIES ROSE was equipped with two, eight person, liferafts that were mounted on the top of the vessel's wheelhouse. By regulation, the SCANDIES ROSE was only required to have one, eight person, liferaft onboard.

4.2.106. The liferafts were equipped with a hydrostatic release device which would activate and release the raft if the vessel sank to a certain water depth.

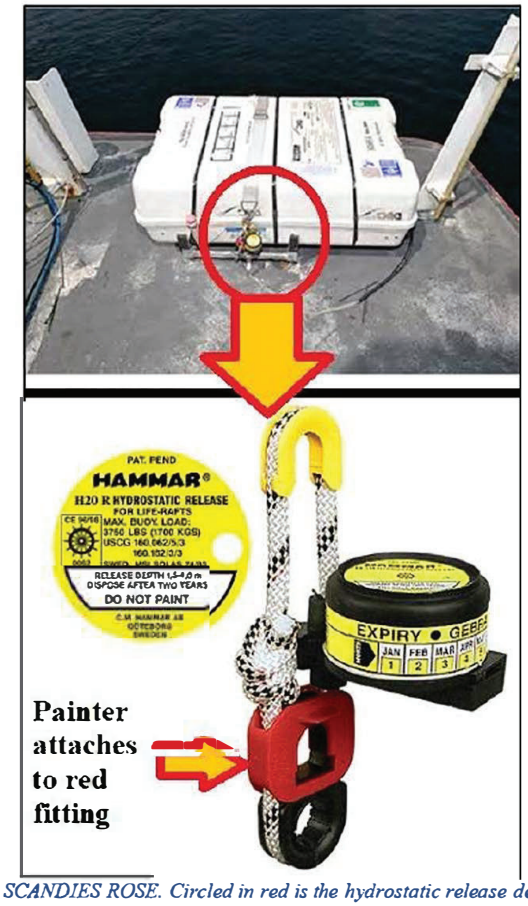


Figure 45 – One of two liferafts on the SCANDIES ROSE. Circled in red is the hydrostatic release device which allows the liferaft to inflate and float free of the vessel as it sank. The close-up of the hydrostatic release device shows the point where the liferaft painter attaches, once the device activates, the raft floats free, inflates and then the painter is released from the device allowing the raft to stay on the surface. (Source CG Exhibit 004 and close-up from the CG D17 Commercial Fishing Vessel Safety Reference Guide http //www.fishsafewest.info/PDFs/D17CFVSE_JobAid.pdf)

4.2.107. The rafts were equipped with a survival equipment bag as well as an exterior and interior canopy light, boarding ladder, sea anchor and other equipment. The raft and its

equipment were classed as a Safety of Life at Sea (SOLAS) A[117] standard. This equipment is generally carried on vessels on longer international voyages. On the exterior of the raft, there were areas covered with retroreflective tape to enhance the ability of rescue forces to locate the raft at night. The canopy was a high visibility orange color.

4.2.108. Both rafts had been serviced and inspected at a certified liferaft servicing facility April 17, 2019 and November 20, 2019.

4.2.109. The rafts are required to contain various visual signaling devices inside the survival equipment bag.

6 Handheld flares
4 Parachute Flares
2 Smoke Flares
1 Signaling Mirror (Day Use)
1 Radar reflector
1 Flashlight[118]

4.2.110. The survivors recounted that when they entered the liferaft and got under the canopy, the raft was partially filled with seawater. The raft was equipped with a boarding platform with grab straps, grab ropes around the hull of the raft, as well as water filled stabilization bags that were beneath the bottom of the raft. This stabilization system was designed to assist in stabilizing the raft in a rough sea. In the case of the SCANDIES ROSE, sea and wind action threatened to capsize the raft and the survivors would move to the side of the raft that was trying to rise up and use their weight to prevent capsizing.

4.2.111. Initially, the interior light in the raft canopy was working and providing interior illumination, but after an undetermined time it was extinguished. The interior light is designed to provide illumination for twelve hours, be operated manually after it automatically illuminates after inflation, and provide enough light to allow the survivors to read the instructions on various equipment in the raft.

4.2.112. The survivors recounted that they had difficulty locating and retrieving survival equipment from the dark interior of the water filled raft. They also talked about the difficulty of using the survival equipment when wearing the survival suit with the attached three finger hand mitt.

Regulatory Framework & Agency Partnerships

4.2.113. The Coast Guard issued the regulations for U.S. documented or state numbered uninspected fishing, fish processing, and fish tender vessels to implement provisions of the

[117] "SOLAS" refers to the International Convention for the Safety of Life at Sea which is an international maritime treaty which sets minimum safety standards in the construction, equipment and operation of merchant ships. The convention requires signatory flag states to ensure that ships flagged by them comply with at least these standards. The current version of SOLAS is the 1974 version, known as SOLAS 1974, which came into force on May 25, 1980. (Wikipedia)
[118] 46 CFR 199.175

Commercial Fishing Industry Vessel Safety Act of 1988, codified in 46 USC 4501-4508.[119] The intent of these regulations is to improve the overall safety of commercial fishing industry vessels, and to reduce CFV fatalities and losses. These regulations provide requirements for the equipment, design, and operations of vessels, and include provisions for lifesaving, firefighting, navigation, communication, emergency instructions, and stability which includes righting energy criteria and freeing port clearing area.

4.2.114. COMDTINST 16711.13B – Implementation of the CFV Regulations (August 1995), establishes the Coast Guard's CFV Safety Program.

4.2.115. When additional or clarifying information is necessary, the Coast Guard provides industry guidance in various forms to help assist and inform CFV operators and examiners. Guidance includes Coast Guard Navigation and Vessel Inspection Circulars (NVICs), Policy Letters, Voluntary Safety Initiative and Good Marine Practices, Safety Flyers, Safety Alerts and Regulatory Reference Guides.

4.2.116. Coast Guard guidance covers a broad range of topics, including rules of the road, safety equipment, and stability. The Coast Guard posts these documents on various Coast Guard web pages, including www.dco.uscg.mil and www.fishsafewest.info.

4.2.117. As part of their duties, Coast Guard Commercial Fishing program managers and CFV examiners distribute Coast Guard guidance information while attending industry association meetings, outreach events, and during dockside safety exams.

4.2.118. The Fishing Vessel Safety Program Manager of the Fishing Vessel Division within the Coast Guard Office of Commercial Vessel Compliance (CG-CVC-3) at Coast Guard Headquarters manages the Coast Guard's Fishing Vessel Safety Program. CG-CVC-3 provides program oversight and guidance, interacting with all Coast Guard District Fishing Vessel Safety Coordinators and, on occasion, with the field examiners including Auxiliary personnel who are qualified to conduct dockside safety exams.

4.2.119. COMDTINST 16711.13B directs Coast Guard Districts to conduct annual audits and oversight of their respective CFV Safety Program. After conducting a review of data within the Coast Guard's MISLE database, this oversight process measures the effectiveness of the program and allows managers to identify program strengths and weaknesses to inform program improvement.

4.2.120. The mission and goal of the D17 Fishing Vessel Safety Program is to enhance safety within the commercial fishing fleet and reduce accidents associated with that industry.

4.2.120.1. The program develops or initiates regulations to implement laws, as well as drafting and issuing guidance regarding current compliance standards for both Coast Guard and industry personnel. The program also promotes awareness and training for safety initiatives, including working with the CFV Federal Advisory Committee and other industry partners at conferences and industry association meetings.

[119] Title 46 CFR 28 final rule became effective on September 15, 1991

4.2.120.2. The program works with NOAA and National Marine Fisheries Service (NMFS) regarding fisheries permitting and National Institute for Occupational Safety and Health (NIOSH) to share and analyze casualty data and implement safety initiatives or recommendations.

4.2.121. COMDTINST 16711.14 – Commercial Fishing Industry Vessel Safety Training and Qualification (March 1993), establishes the training and qualification process for Coast Guard personnel performing dockside examinations. The intent of the training is to provide the examiner with additional technical skills and specific knowledge of current regulations and policies.

4.2.122. CFV examiners are tasked with executing the Commercial Fishing Vessel safety program including conducting CFV exams and issuing safety decals when vessels meet the applicable regulatory standards.

4.2.123. The Coast Guard Authorization Act (CGAA) of 2010 and the Coast Guard and Maritime Transportation Act (CGMTA) of 2012 both amended 46 USC Chapter 45 – Uninspected Commercial Fishing Industry Vessels. In particular, it amended 46 USC 4502(f) to direct both State-registered and federally-documented vessels that operate beyond three NMs from shore to complete a Coast Guard dockside safety examination no later than October 15, 2015. CFVs that met these criteria, including the SCANDIES ROSE, had to complete this safety examination at least once every five years thereafter.

4.2.124. There are five full time civilian CFV examiners for the D17's Area of Responsibility (AOR). The CFV Program has incorporated the use of qualified Coast Guard Auxiliary personnel to augment the CFV work force to facilitate responsiveness to the approximately 8,500 fishing vessel fleet that operates in the District 17 AOR. The Coast Guard also utilizes active duty military officers, warrant officers, and enlisted personnel CG-wide to conduct CFV examinations.

4.2.125. Upon successful completion of a dockside exam, the examiner issues an examination decal, valid for two years. In D17, CFV Safety examinations are documented using a district-produced examination booklet. This booklet lists items from the standard CFVS Exam Booklet CG-5587 (Rev 06-08), but tailors it to district-specific items and data gathering requirements.

Figure 46 – A sample of a Commercial Fishing Vessel Safety Decal which would be issued to a vessel after it has been inspected by qualified Coast Guard Fishing Vessel Examiners and found to be in compliance with the requirements of Title 46 CFR 28. (Source Coast Guard)

4.2.126. The scope of the CFV exam is limited primarily to the safety equipment on the vessel as opposed to the design or material condition of the vessel. In addition, the scope of the exam precludes a CFV examiner from assessing an operator's technical knowledge.

4.2.126.1. COMDTINST 16711.13B directs dockside safety examiners to use the CFV Safety Examination Booklet, CG-5587. This booklet assists examiners by providing a comprehensive listing of regulations in a checklist format. The instruction indicates the booklet is self-explanatory and lets the examiner and fishing vessel operator know exactly which regulations are applicable, complied with, and whether there are any deficiencies uncovered in the exam.

4.2.126.2. The CFV Safety Examination Booklet, CG-5587, under certain checklist items, references and directs CFV examiners to utilize the supplement, CG-5587B. The supplement provides additional checklist items, including requirements based on tonnage, operating area, alteration or conversion date, and pollution prevention requirements.

4.2.126.3. When the examiner notes deficiencies during the exam, they advise the operator of the deficiency, document it in writing using the examination form, and encourage the operator to correct all deficiencies as soon as possible. Coast Guard examiners document the results of the dockside safety exam into the Coast Guard MISLE database under a fishing vessel examination activity.

4.2.127. Coast Guard regulations contained within 46 CFR 28.73 and 28.76 and policies detailed in Coast Guard work instruction CVC-WI-019(1) establish the Third Party Examiner Program. Under the program, designated third party examiners such as a third party surveyor are authorized to conduct periodic dockside safety examinations upon the request of the vessel owners. Accepted organizations or similarly qualified organizations request designation from Coast Guard Commandant to carry out dockside safety examinations.

4.2.127.1. The SCANDIES ROSE did not receive Third Party examination. Coast Guard CFV examiners conducted all commercial fishing exams for the SCANDIES ROSE prior to the accident voyage.

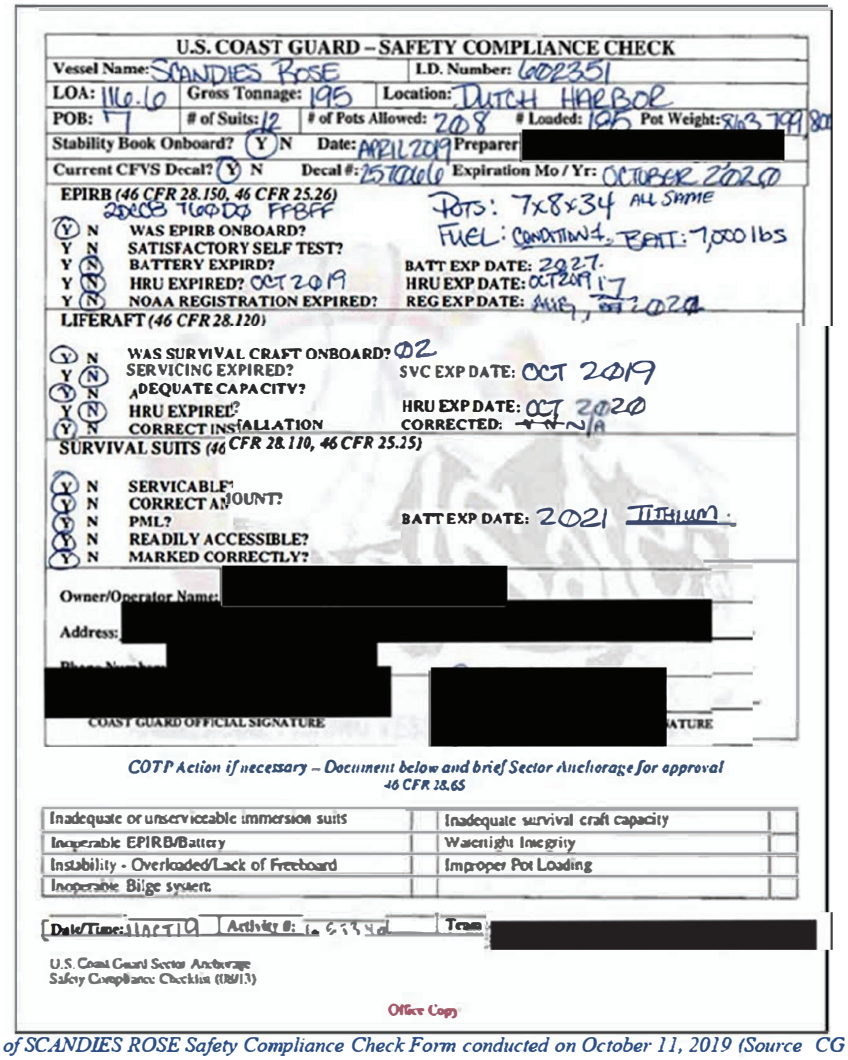
4.2.128. On or about October 13, 2018, the SCANDIES ROSE participated in a dockside safety examination in Dutch Harbor, AK.

4.2.128.1. This exam was conducted by Coast Guard safety examiners and the evolution was documented in the Coast Guard's MISLE database under activity # 6596171.

4.2.128.2. No deficiencies were noted and safety decal # 257066 was issued to the SCANDIES ROSE.

4.2.129. Developed in 1999, the Coast Guard initiated dockside Safety Compliance Checks to assist in reducing fatalities and vessel loss within the Bering Sea/Aleutian Island (BSAI) crab fleet. The goal of Safety Compliance Checks was to deter vessels from overloading with crab pots. Coast Guard D13 and D17 collaborated with the Alaska Crab Coalition, NIOSH, Alaska Department of Fish and Game (ADF&G), and the North Pacific Fishing Vessel Owners' Association (NPFVOA) to develop the Safety Compliance Check.

4.2.130. On or about October 11, 2019, the SCANDIES ROSE participated in a Safety Compliance Check in Dutch Harbor, AK, prior to participating in the king crab season. At the time of the Safety Compliance Check, the vessel was loaded with 185 pots. The three crab pots sampled all measured 7 ft x 8 ft x 2.8 ft and weighed 863, 799, and 800 pounds, respectively.



U.S. COAST GUARD – SAFETY COMPLIANCE CHECK

Vessel Name: SCANDIES ROSE | I.D. Number: 602351

LOA: 116.6 | Gross Tonnage: 195 | Location: DUTCH HARBOR

POB: 17 | # of Suits: 12 | # of Pots Allowed: 208 | # Loaded: 185 | Pot Weight: 863, 799, 80

Stability Book Onboard? (Y) N | Date: APRIL 2019 | Preparer: [redacted]

Current CFVS Decal? (Y) N | Decal #: 257006 | Expiration Mo / Yr: OCTOBER 2020

EPIRB (46 CFR 28.150, 46 CFR 25.26) 2DECB 7C0D0 FFBFF

POTS: 7x8x34 ALL SAME

FUEL: CONDITION 4. BAIT: 7,000 lbs

(Y) N WAS EPIRB ONBOARD?
Y N SATISFACTORY SELF TEST?
Y (N) BATTERY EXPIRD? | BATT EXP DATE: 2027.
Y (N) HRU EXPIRED? OCT 2019 | HRU EXP DATE: OCT 2019 17
Y (N) NOAA REGISTRATION EXPIRED? | REG EXP DATE: AUG, OCT 2024

LIFERAFT (46 CFR 28.120)

(Y) N WAS SURVIVAL CRAFT ONBOARD? 02
Y (N) SERVICING EXPIRED? | SVC EXP DATE: OCT 2019
(Y) N ADEQUATE CAPACITY?
Y (N) HRU EXPIRED? | HRU EXP DATE: OCT 2020
(Y) N CORRECT INSTALLATION | CORRECTED: N/A

SURVIVAL SUITS (46 CFR 28.110, 46 CFR 25.25)

(Y) N SERVICABLE?
(Y) N CORRECT AMOUNT?
(Y) N PML? | BATT EXP DATE: 2021 LITHIUM
(Y) N READILY ACCESSIBLE?
(Y) N MARKED CORRECTLY?

Owner/Operator Name: [redacted]

Address: [redacted]

[redacted]

COAST GUARD OFFICIAL SIGNATURE [redacted] ATURE

COTP Action if necessary – Document below and brief Sector Anchorage for approval 46 CFR 28.65

Inadequate or unserviceable immersion suits	Inadequate survival craft capacity
Inoperable EPIRB/Battery	Watertight Integrity
Instability - Overloaded/Lack of Freeboard	Improper Pot Loading
Inoperable Bilge system	

Date/Time: 11OCT19 | Activity #: [redacted] | Team: [redacted]

U.S. Coast Guard Sector Anchorage
Safety Compliance Checklist (D8/13)

Office Copy

Figure 47 – Copy of SCANDIES ROSE Safety Compliance Check Form conducted on October 11, 2019 (Source CG Exhibit 034)

4.2.131. When compared to other occupations in the U.S., commercial fishing is historically a dangerous job. Data for 2019, gathered by the U.S. Bureau of Labor Statistics and published in late 2020, indicated that "Fishing and hunting workers had a fatal injury rate of

145 fatal work injuries per 100,000 full time equivalents (FTEs) in 2019, which was ranked the highest in all other groups.[120]

4.2.132. NIOSH is the government agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. In 2016, NIOSH published a report titled "Assessment of Safety in the Bering Sea/Aleutian Islands Crab Fleet" and provided "a detailed analysis of work-related injuries and vessels safety issues within the BSAI crab fleet" for the purpose of identifying both hazards and opportunities for safety improvements within that fleet. The report focused on data from the 2005-06 through 2012-13 fishing seasons but also used data from previous studies for comparison and analysis. During the 1990s, the BSAI crab fleet was the most dangerous commercial fishery in the U.S., claiming 73 lives. However, between 1999 and 2013, the fishery fatality rate dropped to less than one death per year. The report predated the DESTINATION and SCANDIES ROSE accidents. As such, it did not include the seven lives lost aboard the DESTINATION in 2017, when the vessel sank while participating in the Bering Sea opilio crab fishery. The five lives lost aboard the SCANDIES ROSE were also not included.

4.2.133. NIOSH is able to collect and analyze data on fatalities due to a longstanding partnership between NIOSH and the Coast Guard that emphasizes data sharing between the two agencies.[121]

4.2.133.1. In 2017, NIOSH published a Commercial Fishing Fatality Summary for the Alaska Region. The document examined commercial fishing fatalities between the years of 2000-2014. One of the leading causes of fatalities came from vessel disasters, including sinking, capsizing, fire, grounding, or other events in which crew are forced to abandon ship. The report listed several recommendations, some of which are included here, directed at minimizing the risk of vessel disasters.

4.2.133.2. The first recommendation was that fishermen take a marine safety class at least every five years, and stated that "safety training is available, affordable and saves lives."

4.2.133.3. Another recommendation was that fishing vessels should adhere to their vessel's stability instructions and vessels should always be loaded in compliance with these instructions.

4.2.133.4. A third recommendation was that a naval architect should be consulted periodically to review safe loading limits of the vessel.

4.2.134. From 1990 to 2000, there was an average of 8 deaths per year associated with the BSAI crab fishery. In the five-year period between 2000 and 2005, the average fatalities per year was reduced to 1.3 annually. NIOSH credited this reduction in deaths to several factors:

[120] News Release Bureau of Labor Statistics, National Census of Fatal Occupational Injuries in 2019. https://www.bls.gov/news.release/pdf/cfoi.pdf
[121] CG Exhibit 130, Pg.5

4.2.134.1. The Coast Guard's implementation of the Safety Stability Checks program which put Coast Guard personnel on commercial fishing vessels prior to the fishing season to weigh pots, complete a basic safety gear inspection, and consult with the vessel's captain regarding the vessel's stability instructions.

4.2.134.2. NIOSH also attributed the reduction in fatalities to shifting from "derby style" to rationalization of the fishery which extended the fishing season, allowing more experienced and less fatigued crew to operate vessels with potentially smaller pot loads.

4.2.134.3. A final factor NIOSH noted was the reduction in the number of vessels participating in the fishery, which was also a result of rationalization.

4.2.134.4. Prior to rationalization, an average of 243 vessels participated in the BSAI crab fishery. Post-rationalization, that average number decreased to 78 vessels as of 2010. The number of vessels participating has further decreased in recent years, as only 59 vessels participated in the 2019-2020 opilio season.

4.2.135. As a fishing vessel of less than 200 GT, the SCANDIES ROSE was not subject to Coast Guard inspection and certification or manning and licensing requirements. However, because the SCANDIES ROSE harvested crab, fished for cod, and operated part-time in the summer months as a fish tender, it was subject to the regulations set forth in 46 CFR Subchapter C – Uninspected Vessels, Part 28 – Requirements for Commercial Fishing Industry Vessels, which includes equipment, stability, and other safety requirements.

4.2.136. Based on the class and type of vessel under the existing regulations, the crew operating the SCANDIES ROSE were not required to have any certification of competency for the duties they performed on the vessel. The Captain and the crew member serving as the engineer had not been holders of a Coast Guard issued MMC.

4.2.137. 46 CFR Subchapter C has specific training requirements. At least one member of the crew must be first aid and CPR certified. In addition, the person who leads the monthly drills must have been trained in the proper emergency procedures. Regulations required these certifications to be obtained through a Coast Guard-approved third party. That requirement was satisfied by way of the Captain's certification as a Drill Conductor.

4.2.138. Monthly drills and instruction were required of the crew while aboard the vessel. At a minimum, the monthly drills and instruction had to cover abandon ship, firefighting, flooding, man overboard, donning an immersion suit, launching a survival craft, making a voice radio distress call, use of visual distress signals, and activation of the general alarm. That requirement was satisfied in the SCANDIES ROSE pre-departure drills and training carried out on December 30, 2019.

4.2.139. The SCANDIES ROSE had a valid Certificate of Documentation (COD) as required for vessels of five Net Tons (NT) or more used in fishing activities on navigable waters of the United States.

4.2.140. The SCANDIES ROSE was also required to participate in the Coast Guard's commercial fishing vessel dockside safety examination program, which primarily focuses on lifesaving equipment and those related practices on board the vessel. This program, as applied to the SCANDIES ROSE, does not include the examination of the design and construction, or sufficiency of the fishing vessel's hull and machinery condition as required for Coast Guard-inspected vessels.

4.2.140.1. The SCANDIES ROSE underwent the required safety examination and was issued a safety decal.[122] No deficiencies were noted and the vessel was issued a decal with an expiration date of October 31, 2020.

4.2.141. ADF&G regulations require BSAI vessels participating in the crab fishery to contact the Coast Guard 24 hours prior to departing port with pots loaded onboard.[123]

4.2.141.1. The regulation does not require any specific action on the part of the Coast Guard, and the Coast Guard does not have regulations or policies that address the ADF&G regulation.

4.2.141.2. When contacted by vessel operators 24 hours prior to departure, Coast Guard will typically ask the operator what size and how many pots the vessel is carrying and encourage the operator to consult their stability instructions.

4.2.141.3. In addition, the Coast Guard will ask the operator if they would like to voluntarily participate and receive a Safety Compliance Check.

4.2.142. The SCANDIES ROSE did not contact the Coast Guard 24 hours prior to departing Kodiak on December 30, 2019. Although the vessel was loaded with pots, the vessel was departing to initially participate in the cod fishery and not the crab fishery, so the ADF&G regulation did not apply in this particular case.

4.2.143. Stability regulations that applied to the SCANDIES ROSE were included in 46 CFR C, Part 28, Subpart E. The regulations state that it is the responsibility of the vessel owner to select a "qualified individual" to perform a stability test and calculations. In the case of the SCANDIES ROSE, that person was a naval architect and that same person conducted stability testing for the vessel in 1988 and in 2019.

4.2.144. The regulations define a qualified individual as "an individual or an organization with formal training in and experience in matters dealing with naval architecture calculations."[124] It is further stated that the intent of the stability instructions are to ensure the masters and individuals in charge of vessels are provided with enough stability information to allow them to maintain their vessel in a satisfactory stability condition.

4.2.145. The regulations note that, because few operating personnel in the commercial fishing industry have had specialized training in vessel stability, stability instructions should

[122] CG Exhibit 034, 13 October 2018 USCG Commercial Fishing Vessel Dockside Examination Form
[123] § 5 AAC 39.670. Bering Sea/Aleutian Islands Individual Fishing Quota (IFQ) Crab Fisheries Management Plan
[124] 46 CFR 28.510

take into account the conditions a vessel may reasonably be expected to encounter and provide simple guidance. The instructions must be developed based on each vessel's individual characteristics and must be in a format that is easily understood by the individual in charge of the vessel.

4.2.146. For vessels which operate in areas where icing conditions are present, like the SCANDIES ROSE, the regulations require stability instructions to factor in the added weight of ice accumulation on the vessel.

4.2.147. The text of the regulation mirrors guidance from the International Maritime Organization (IMO). It requires 1.3-inch thick ice to be applied to continuous horizontal surfaces and 0.65-inch thick ice to be applied to vertical surfaces and assumes that ice accumulation around a stack of crab pots is distributed evenly. However, the regulation does not provide guidance for the manner in which crab pots should be treated for icing and does not refer to a formal study or test when giving guidance on how to calculate ice accumulation on crab pots webbing, framework, or the gear stored inside the pots themselves. A panel of naval architects was called as witnesses for the MBI Hearing and counsel for the vessel owners asked them about the term "shoebox" as it applies to how the regulations take icing into account. The regulation does not provide clarification how the icing conditions are to be applied to the sides of the vessel and in the case of the SCANDIES ROSE, the crab pot stack.

> *MR.* [redacted] *And you've talked about a shoebox, and the concept of a shoebox has been used, but again, I want to make sure this is really understandable. If you put a giant shoebox over the stack of crab pots and accumulated ice on that shoebox, six-tenths of an inch on the vertical surfaces and 1.3 inches or so on the horizontal surfaces, is that what the regulations tell you to do in calculating icing?*
> *MR.* [redacted] *That's the guidance it provides, yes.*
> *MR.* [redacted] *Okay. And does -- do the regulations also assume that that ice will accumulate uniformly over those surfaces?*
> *MR.* [redacted] *It does.*[125]

4.2.148. During the MBI Hearing, BSAI crab fishermen and industry naval architects said that, in reality, ice accumulates asymmetrically on pot stacks—the side of the stack that is exposed to the wind and freezing spray accumulates the majority of the ice, while the opposite side could accumulate very little. The formation of ice at sea on a vessel encountering asymmetrical icing can cause the vessel to list or heel to one side or the other and it may affect the fore and aft trim of the fishing vessel. They further stated that ice also accumulates on the interior webbing of the pots, something that is not accounted for in the regulations.

4.2.149. The regulations for commercial fishing vessels like the SCANDIES ROSE do not specify the length of time stability instructions and stability books are valid. In fact, stability instructions produced by a qualified individual for vessels such as the SCANDIES ROSE are

[125] Naval Architect Hearing Panel, MBI Hearing Transcript, Pg. 451

valid for the life of the vessel as long as no major alterations or modifications have been made.

Stability

Stability Analysis by Marine Safety Center

4.2.150. The Marine Board formally requested that the Coast Guard's Marine Safety Center (MSC) conduct an analysis on the design and construction of the SCANDIES ROSE as it related to the stability of the vessel during the accident voyage. The MSC's Naval Architect completed that tasking and prepared a report and analysis which was introduced as CG Exhibit 059, the Technical Report, SCANDIES ROSE Stability Analysis, February 8, 2021.

4.2.151. There were two stability instructions prepared for the SCANDIES ROSE, one in 1988 and one in 2019. Both stability assessments and their stability instructions were completed by the same Naval Architect.

4.2.152. The majority owner was asked about his decision to select the same naval architect that had done the previous stability assessment work in 1988:

> *I used [redacted] just because he had done the previous one, that was the -- that was the impetus, that was the sole impetus.*[126]

4.2.153. The owner was asked why he had a stability analysis done and an instruction prepared in 2019 and he testified:

> *Q. ...Sir, have you ever examined either the Coast Guard or National Transportation Safety Board's Report of Investigation for the Destination, for the sinking of the Destination?*
> *A. No, did not read the report, but that's the reason why I did a new stability report for the SCANDIES ROSE. We just thought -- figured that everybody's using heavier pots than stability reports were written for and a lot of these vessels have had alterations, whether minor or major, and I just thought it was prudent to do a new incline test.*[127]

4.2.154. The incline test, which is the foundation for a stability instruction, was performed in the Seattle area in mid-April 2019. Once the physical tests dockside were complete on the actual vessel, the Naval Architect completed the calculations that resulted in the stability instructions being prepared for the client.

4.2.155. Due to a previous fire onboard resulting in design modifications, the SCANDIES ROSE, in 2019, differed from the 1977 plans of the vessel in several areas.

[126] Captain [redacted] MBI Hearing Transcript, Pg. 97
[127] Captain [redacted] MBI Hearing Transcript, Pg. 59

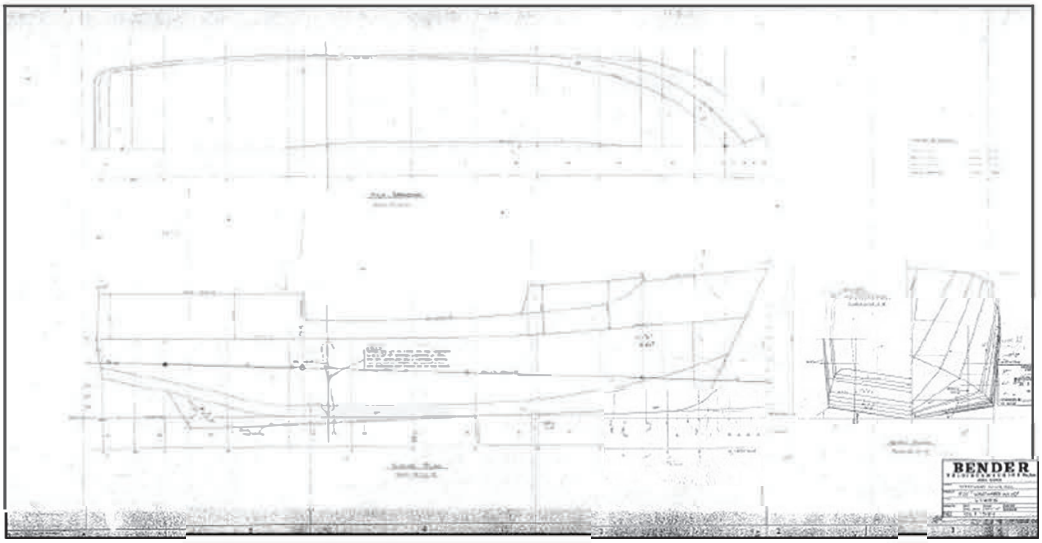


Figure 48 – SCANDIES ROSE Lines Plans, dated May 1977. (Source Coast Guard MSC Report, CG Exhibit 059)

Figure 49 – SCANDIES ROSE around the time of delivery in 1978. Formerly called the ENTERPRISE. (Source Coast Guard MSC Report)

4.2.156. The MSC took recent photos of the SCANDIES ROSE and overlaid them on the original plans to determine if there were any differences in the modern configuration of the vessel in comparison to the original vessel as noted in the figure above. There were differences noted as shown in figures 50 and 51, below. The MSC then used computerized hydrostatic modeling to determine the stability characteristics for the SCANDIES ROSE based on the available drawings, photographs, naval architect's notations, documentary evidence, and other available information.

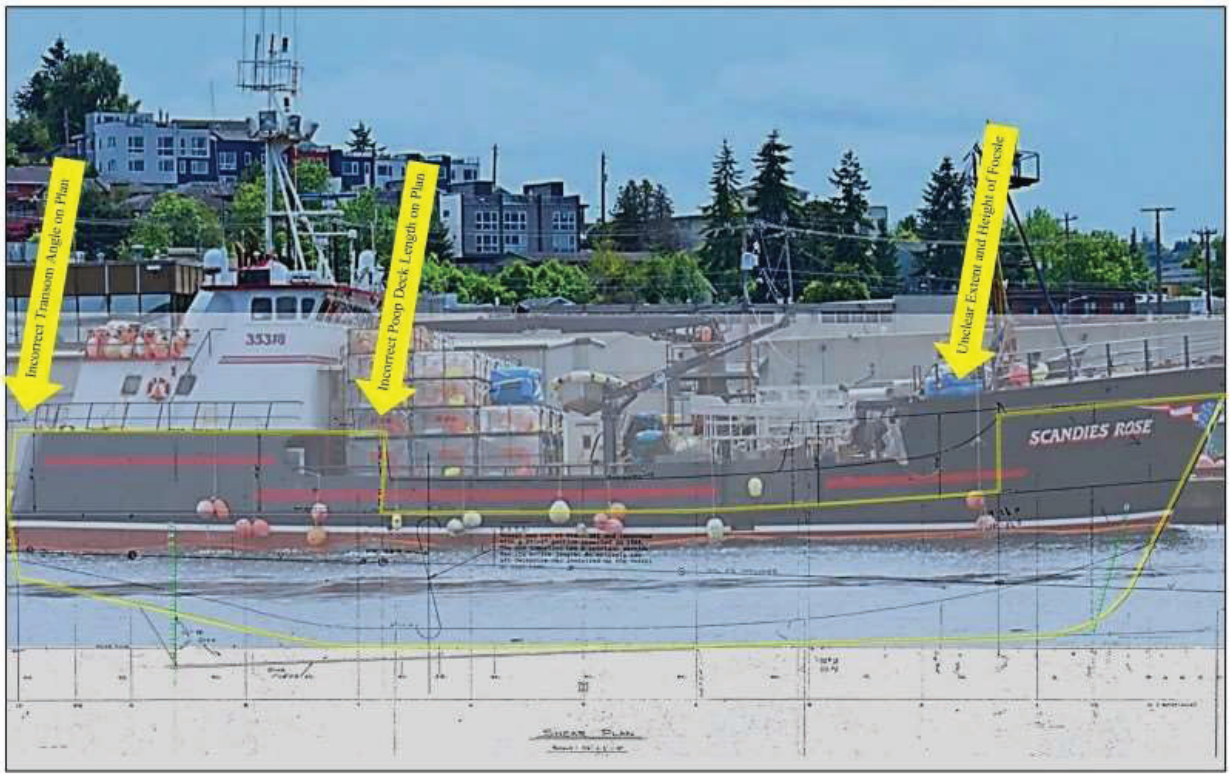


Figure 50 - Profile photograph of SCANDIES ROSE with Line Plans overlaid with watertight envelope highlighted in yellow and large profile differences in poop and forecastle called out. (Source; Coast Guard MSC Report, CG Exhibit 059)

Figure 51 - Profile photograph of the SCANDIES ROSE with Scantling Plan and Profile overlaid. Note that the plan matches the vessel's transom but indicates additional buoyant volume at the forward end of the poop. (White highlighted area) (Source USCG MSC Report, CG Exhibit 059)

Downflooding Points into the Interior of the Vessel

4.2.157. The Naval Architect who created the 1988 and 2019 stability documents wrote the following note in his work documents related to the downflooding considerations posed by the engine room air intakes located on each side of the vessel.

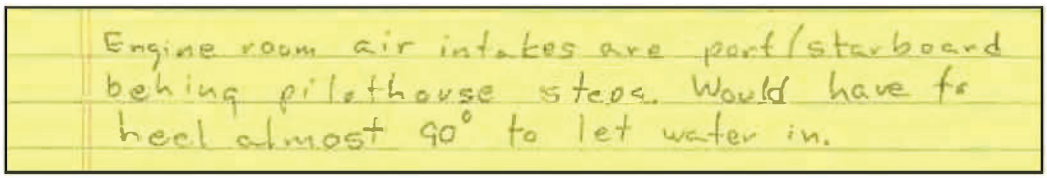


Figure 52 – SCANDIES ROSE Naval Architect's working notation on the location of the air intakes for the engine room and their potential for downflooding into the interior of the vessel. (Source CG Exhibit 039)

4.2.158. In testimony, the location and routing of possible flooding were discussed with the Naval Architect who authored the 2019 stability instruction:

> *Q. Okay. And then, do you remember how you calculated the angle of downflooding in 2019?*
> *A. I asked the owner about the air intake for the engine room. That's normally where the downflooding point would be. He told me that it was up high, right behind the steps from the pilot house. I think it's in the side of the stack. It's real high, and maybe 2 or 3 feet off the fender line, so I didn't feel like it would be a factor and I didn't put it into the computer model.*
> *Q. Okay. Did -- when you were out there, did you verify where those downflooding points were?*
> *A. No, I didn't go up there. Since then, I went and -- because there was an issue about it, I went and visited the other sister ship, the Westwood*[128] [sic] *Wind, and went up on it. And the opening was where I thought it would be. It's possible that there's some other kind of opening. I don't think they could have had the engine room intake down any lower.*
> *Q. So, and you said about 2 feet off the centerline. Are you aware that the engine room air intake ventilation's underneath the ladder wells that go up to the bridge, so that essentially more outboard and towards the side of each, on both the port and starboard side?*
> *A. I didn't go up and look at where they actually are. I think where they would go down into the trunk would be almost right on the centerline.*[129]

4.2.159. The MSC calculated that the lowest downflooding points are the engine room vents, which are noted to be behind the stairs to the pilothouse on the poop deck. The location of these vents is indicated on the "Poop and Focsle Deck" which shows them as 4 feet long, on the poop deck between frames 45 and 47, and 12 feet 10 inches off centerline on both the port and starboard sides.[130] These vents lead directly down into the engine room from their location on each side of the vessel. The MSC calculated that the resulting downflooding angle from these vents would be only 35 degrees at typical loaded draft condition of the

[128] Spelling error in the transcript; should be "westward"
[129] Mr. [redacted] MBI Hearing Transcript, Pg. 1861
[130] CG Exhibit 059, Reference (f) Bender Welding & Machine Co., Inc., "Poop and Focsle Deck," 132B-108-1, Rev. 1, Dated Sept-1977

vessel, which was significantly less than the downflooding angle which Mr. [redacted] testified to.

Figure 53– Engine room air intakes under and behind the stairs leading up to the SCANDIES ROSE wheelhouse highlighted by red box and yellow arrow. The air intakes are near the outboard side of the vessel and lead directly down into the vessel's engine room. (Source CG Exhibit 004, with markup)

4.2.160. The capacity and volume of the contents of the cargo, fuel, and water tanks of the SCANDIES ROSE was captured in a tank plan created in 2007.

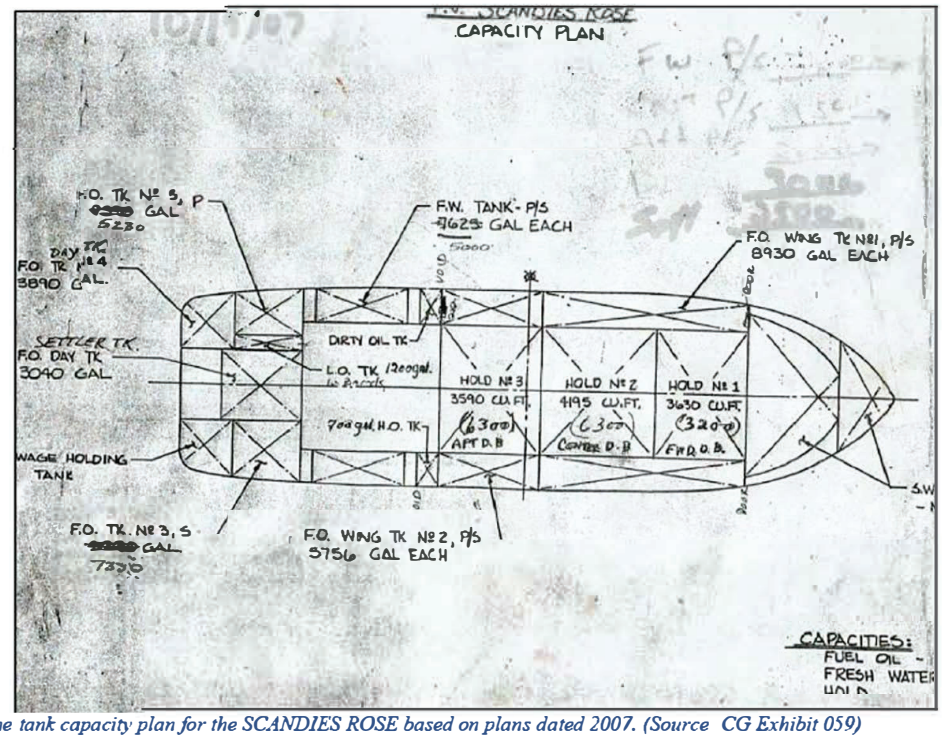


Figure 54 – The tank capacity plan for the SCANDIES ROSE based on plans dated 2007. (Source CG Exhibit 059)

4.2.161. During the course of modeling the vessel, MSC calculated the volumes of many of the tanks to differ from those reported by the Naval Architect. Developing stability

instructions with inaccurate tank quantities can affect the stability limitations imposed on the vessel by a naval architect. The differences between the MSC model and the Naval Architect's model indicate that deviations in tank load weights were less than 1% of the total displacement of the vessel as shown in the figure below which focuses on the 11 loading conditions captured in the 2019 stability instructions.

Loading Condition	Hydro-Statics Model	Tank fwdwing (s) Weight Diff. (LT)	Tank fwdwing (p) Weight Diff. (LT)	Tank midwing (s) Weight Diff. (LT)	Tank midwing (p) Weight Diff. (LT)	Tank aftwing (s) Weight Diff. (LT)	Tank aftwing (p) Weight Diff. (LT)	Tank water (s) Weight Diff. (LT)	Tank water (p) Weight Diff. (LT)	Tank aftfuel (s) Weight Diff. (LT)	Tank aftfuel (p) Weight Diff. (LT)	Tank Lubeoil (p) Weight Diff. (LT)	Tank daytank (p) Weight Diff. (LT)	Tank sewage (s) Weight Diff. (LT)	Tank dblbtmc Weight Diff. (LT)	Total Difference (LT)	% Difference (of Displacement, LT)
2019 Stability Book Condition 1: Max Consumables, 208 Pots, Holds 2 and 3 full	MSC	0.0	0.0	-0.3	-0.3	-2.1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**4.8**	0.45%
2019 Stability Book Condition 2: 75% Consumables, 208 Pots, Holds 2 and 3 Full	MSC	0.0	0.0	0.0	0.0	-2.1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**4.2**	0.41%
2019 Stability Book Condition 3: 50% Consumables, 208 Pots, Holds 2 and 3 Full	MSC	0.0	0.0	0.0	0.0	-2.1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**4.2**	0.41%
2019 Stability Book Condition 4: 25% Consumables, 208 Pots, Holds 2 and 3 Full	MSC	0.0	0.0	0.0	0.0	-2.1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**4.2**	0.43%
2019 Stability Book Condition 5: 10% Consumables, 208 Pots, Holds 2 and 3 Full	MSC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	0.00%
2019 Stability Book Condition 6: Max Consumables, Tendering, All Holds Full	MSC	0.0	0.0	-0.3	-0.3	-2.1	-2.1	0.0	0.0	-0.3	-1.6	0.0	0.0	0.0	0.0	**6.7**	0.58%
2019 Stability Book Condition 7: 75% Consumables, Tendering, All Holds Full	MSC	0.0	0.0	0.0	0.0	-2.1	-2.1	0.0	0.0	-0.3	-1.6	0.0	0.0	0.0	0.0	**6.1**	0.55%
2019 Stability Book Condition 8: 50% Consumables, Tendering, All Holds Full	MSC	0.0	0.0	0.0	0.0	-2.1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**4.2**	0.40%
2019 Stability Book Condition 9: 25% Consumables, Tendering, All Holds Full	MSC	0.0	0.0	0.0	0.0	-2.1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**4.2**	0.41%
2019 Stability Book Condition 10: 10% Consumables, Tendering, All Holds Full	MSC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	0.00%
2019 Stability Book Condition 11: Crabbing, 3 Holds Full, 168 Pots	MSC	0.0	0.0	-0.3	-0.3	-2.1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**4.8**	0.41%

Figure 55 – This table is an excerpt from Table 27 in the MSC Final Technical Report. The table shows the differences in tank loads between the MSC model and the load conditions specified in the calculation prepared by the Naval Architect to produce the 2019 stability instructions. (Source CG Exhibit 059, Pg. 66)

Stability Instructions to the Master of the SCANDIES ROSE

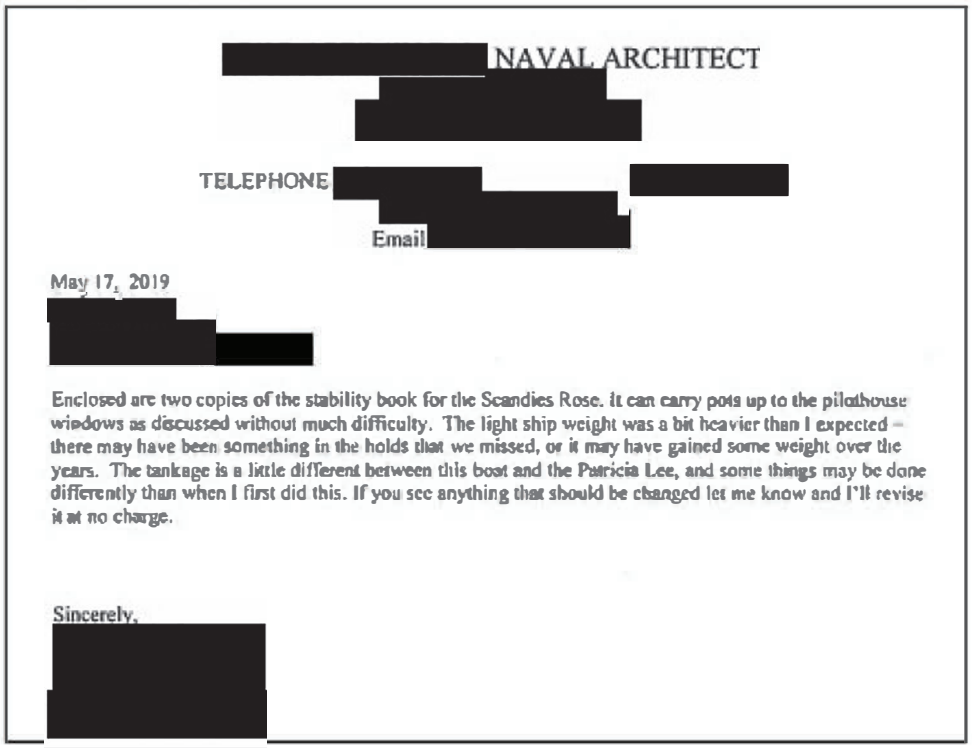
4.2.162. 46 CFR 28.530 provides regulatory information for the stability instructions for the operation of a commercial fishing vessel:

> *Each vessel must be provided with stability instructions which provide the master or individual in charge of the vessel with loading constraints and operating restrictions which maintain the vessel in a condition which meets the applicable stability requirements of this subpart*
>
> (*c) Stability instructions must be developed by a qualified individual.*

(d) Stability instructions must be in a format easily understood by the master or individual in charge of the vessel. Units of measure, language, and rigor of calculations in the stability instructions must be consistent with the ability of the master or the individual in charge of the vessel. The format of the stability instructions may include, at the owner's discretion, any of the following:
(1) Simple loading instructions;
(2) A simple loading diagram with instructions;
(3) A stability booklet with sample calculations; or
(4) Any other appropriate format for providing stability instructions.

4.2.163. During the course of this investigation, several stability instructions were collected as evidence and formally documented as exhibits for this investigation[131] which were referred to or titled as stability booklets or stability books. These widely accepted industry terms are considered synonymous with referring to the stability instructions. For the purpose of the investigation, the regulatory term stability instruction will be used to refer to as the cumulative document that is provided to the master or individual in charge of the vessel to inform them of important stability information such as loading constraints and operating restrictions which maintain the vessel in a condition that meets the stability requirements as outlined in Title 46 CFR, Part 28. If a figure or witness quote addresses a stability book or stability booklet, it should be accepted as meaning the stability instructions.

4.2.164. The Naval Architect developed the 2019 stability instructions and included this note into the bound copy of the documents


[redacted] NAVAL ARCHITECT
[redacted]
TELEPHONE [redacted]
Email [redacted]

May 17, 2019

[redacted]

Enclosed are two copies of the stability book for the Scandies Rose. It can carry pots up to the pilothouse windows as discussed without much difficulty. The light ship weight was a bit heavier than I expected – there may have been something in the holds that we missed, or it may have gained some weight over the years. The tankage is a little different between this boat and the Patricia Lee, and some things may be done differently than when I first did this. If you see anything that should be changed let me know and I'll revise it at no charge.

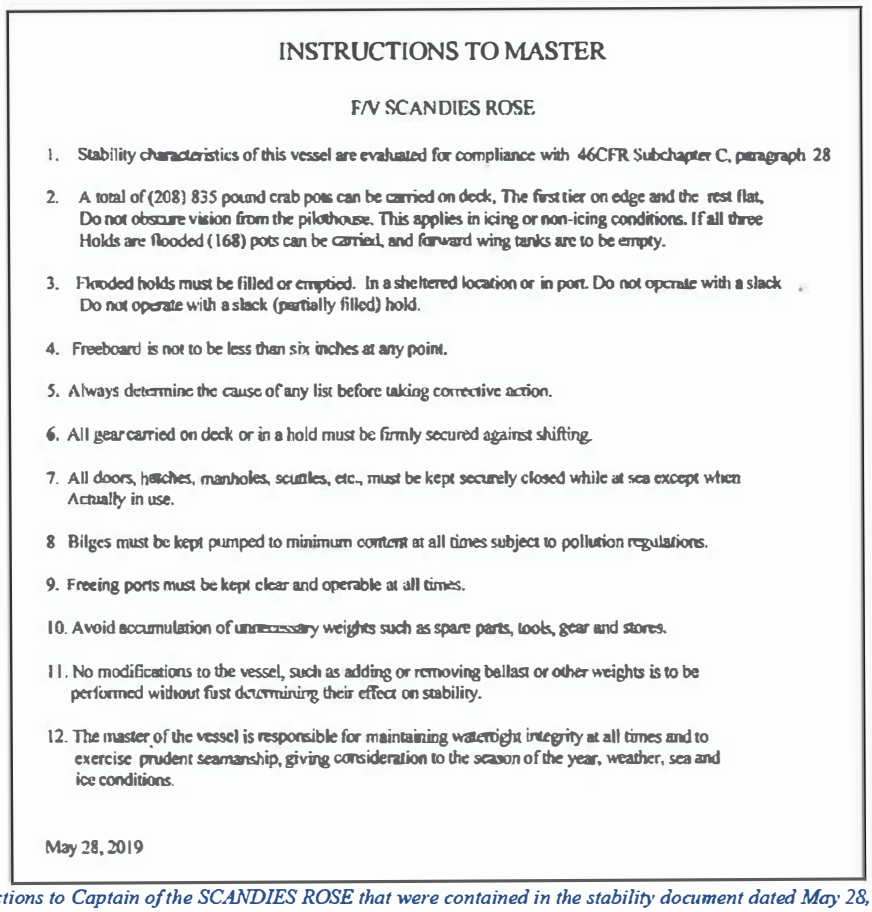
Sincerely,

[redacted]

Figure 56 – Letter to owner that was bound into and included with the 2019 stability instructions. (Source CG Exhibit 036)

[131] CG Exhibits 035, 036, and 134.

4.2.165. The 2019 stability instructions that were provided to the owner contained these instructions to the Captain of the SCANDIES ROSE.



INSTRUCTIONS TO MASTER

F/V SCANDIES ROSE

1. Stability characteristics of this vessel are evaluated for compliance with 46CFR Subchapter C, paragraph 28
2. A total of (208) 835 pound crab pots can be carried on deck, The first tier on edge and the rest flat, Do not obscure vision from the pilothouse. This applies in icing or non-icing conditions. If all three Holds are flooded (168) pots can be carried, and forward wing tanks are to be empty.
3. Flooded holds must be filled or emptied. In a sheltered location or in port. Do not operate with a slack Do not operate with a slack (partially filled) hold.
4. Freeboard is not to be less than six inches at any point.
5. Always determine the cause of any list before taking corrective action.
6. All gear carried on deck or in a hold must be firmly secured against shifting.
7. All doors, hatches, manholes, scuttles, etc., must be kept securely closed while at sea except when Actually in use.
8. Bilges must be kept pumped to minimum content at all times subject to pollution regulations.
9. Freeing ports must be kept clear and operable at all times.
10. Avoid accumulation of unnecessary weights such as spare parts, tools, gear and stores.
11. No modifications to the vessel, such as adding or removing ballast or other weights is to be performed without first determining their effect on stability.
12. The master of the vessel is responsible for maintaining watertight integrity at all times and to exercise prudent seamanship, giving consideration to the season of the year, weather, sea and ice conditions.

May 28, 2019

Figure 57 - Instructions to Captain of the SCANDIES ROSE that were contained in the stability document dated May 28, 2019. (Source CG Exhibit 036)

Regulatory Standards for Icing

4.2.166. The regulations regarding the ice accumulation on commercial fishing vessels operating in Alaska or in the waters of the northeastern U.S. require consideration for ice buildup on the vessel when creating the stability instructions.

4.2.167. The regulatory icing standards account for a uniform or symmetrical loading of ice.

4.2.168. 46 CFR 28.550 reads in part and with the applicable portion highlighted, as the SCANDIES ROSE was operating at or near latitude 56° 29', North.

28.550 Icing.
(a) Applicability. Each vessel that operates north of 42° North latitude between November 15 and April 15 or south of 42° South latitude between April 15 and November 15 must meet the requirements of this section.

(b) Except as provided in paragraph (d) of this section, the weight of assumed ice on each surface above the waterline of a vessel which operates north of 66°30' North latitude or south of 66° South latitude must be assumed to be at least:

(1) 6.14 pounds per square foot (30 Kilograms per square meter) of horizontal projected area which corresponds to a thickness of 1.3 inches (33 millimeters); and

(2) 3.07 pounds per square foot (15 Kilograms per square meter) of vertical projected area which corresponds to a thickness of 0.65 inches (16.5 millimeters).

(c) Except as provided in paragraph (d) of this section, the weight of assumed ice on a vessel that operates north of 42° North but south of 66°30' North latitude or south of 42° South but north of 66° South latitude must be assumed to be at least one-half of the values required by paragraphs (b)(1) and (b)(2) of this section.

4.2.169. When testifying, the MSC naval architect was asked about the implications for this icing criteria being applied to a fishing vessel, like the SCANDIES ROSE

Q. …The regulatory basis for the icing conditions in a stability study appears to me, and tell me if I've got this, to have two serious flaws. The first is the regulation assumes an even coat of ice 0.6 inches approximately on vertical surfaces and 1.3 inches on horizontal surfaces, and that is spread evenly in the shape of a shoebox over the top of the crab stack; is that correct?
A. That's correct. It's supposed to be applied to surfaces. So if the crab pots are assumed to be surfaces, then that would be how you would apply it.[132]

4.2.170. In 2005, the Coast Guard published *A Best Practices Guide to Vessel Stability* for commercial fishermen. The guide provides a general overview of fishing vessel stability and addresses icing caused by winds and waves. It states that:

Stability is the ability of a fishing vessel to return to its upright position after being heeled over by any combination of wind, waves, or forces from fishing operations…A fishing vessel's stability is constantly changing during its voyage. An originally stable fishing vessel may become unstable from changes in the weather, the vessel's loading or fishing operations…The key to having a stable vessel is making sure there is always be sufficient stability to counter the capsizing moments from the current weather, waves, and fishing conditions during the entire voyage.

4.2.171. In January 2017, the Coast Guard published *Voluntary Safety Initiatives and Good Marine Practices for Commercial Fishing Industry Vessels.* The target audience for the document was operators of vessels greater than 50 feet in length, operating beyond three NMs from shore, and more than 25 years old. The initiatives and good marine practices contained in the document were reviewed, validated, and recommended by the Commercial Fishing Safety Advisory Committee (CFSAC), which represented the industry.

[132] Mr. [redacted] MBI Hearing Transcript, Pg. 671

4.2.171.1. One section was devoted to Stability Standards, in which the Coast Guard recommended that a vessel's stability instructions "should be" updated by a qualified individual every five years, or after a modification or alteration occurs to the vessel. In addition, they stated that the operator of the vessel should be provided training on vessel stability and on specific loading conditions of their vessel. The guidance also included information to better help vessel owners beware of weight creep and other changes a vessel can experience over time. Weight creep is the weight added to a vessel over time from modifications, alterations, or the addition of fishing gear and spare parts. The added weight can significantly change a fishing vessel's overall stability. Regulations do not reflect this guidance.

Stability and the Accident Voyage

4.2.172. The SCANDIES ROSE departed Kodiak on the accident voyage with a "pot stack" consisting of between 192 and 198 combination crab pots, under the 208-pot limit stated on the vessel's stability instructions.[133] The Captain reported to Captain [redacted] in one of the last phone calls before sinking that he had 195 pots aboard.

4.2.173. The pots were not weighed prior to departure as they had been before king crab season, but the majority owner indicated that they were the same pots that were used during the king crab season but with new webbing installed.

4.2.174. The majority of pots were stacked five high, with the exception of those in front of the starboard wheelhouse operating station where the pots were only stacked four high so that the crew could have less obstructed line of sight while navigating the vessel. The lower first tier of pots were positioned on their sides.

4.2.174.1. The pots were secured to the vessel with chains running across the SCANDIES ROSE from side to side, across the vessel. Those chains were tightened with chain binders to get all the slack out of the chain and secure the load.

4.2.174.2. A small amount of gear was put onto the top of the stack, which included the sorting table.

4.2.174.3. The majority owner and surviving crew were not certain about the status of the three crab tanks during the voyage but agreed that the number 1 tank was most likely empty, while the number 2 and 3 tanks were most likely full.[134]

[133] Captain [redacted] CG Exhibit 132, Pre-hearing Transcript, Pg. 393
[134] Captain [redacted] CG Exhibit 132, Pre-hearing Transcript, Pg. 107, 109

Figure 58 – SCANDIES ROSE at the dock just prior to departure with chain binders, chains and height of the pot stack at its highest point shown. (Source Mr. [redacted] and Mr. [redacted]

4.2.175. On or about September 2019, after the summer tendering season, the SCANDIES ROSE was topped off with fuel.

4.2.176. The majority owner estimated that, while operating, the vessel would consume approximately 1,000 gallons of fuel per day.

4.2.177. The vessel operated about 15 days during the 2019 king crab season before returning to port in Kodiak, Alaska.

4.2.178. On or about December 30, 2019, the SCANDIES ROSE loaded 2,100 gallons of fuel. Taking into account the amount of fuel that was consumed while operating and while tied to the dock in between fishing seasons, the majority owner believed that the fuel taken prior to departure was to top off the number 2 port and starboard wing tanks, and that the number 1 port and starboard wing tanks were empty.[135]

4.2.179. The vessel loaded 14,928 pounds of bait into the freezers forward and topped off the potable water tanks prior to departure.[136]

[135] CG Exhibit 012, Pg. 8
[136] CG Exhibit 013

Commercial Pressure and SCANDIES ROSE Operations

4.2.180. The SCANDIES ROSE was planning to participate in the BSAI Pacific cod fishery right after the season start on January 1, 2020. The plan was for the vessel to finish fishing for cod and shift to the BSAI opilio crab fishery. After departing Kodiak, the plan was to fish for Pacific cod with the modified crab traps that were the same crab pots that would later be used for opilio crab.

4.2.181. Prior to departure, the pots, fitted with new webbing, had to be rigged and triggers for cod had to be installed on each pot. Later, the crab pots would have to be reconfigured slightly for crab fishing operations by removing the cod triggers upon completion of cod fishing.

4.2.182. In testimony, the vessel manager laid out the details of the fishing plan

> *You know, are we going to fish codfish before opilio, which is the only real question mark because king crab opens, you're going to fish king crab. There's not a question of oh, well, we're going to skip king crab this year, you wouldn't, you wouldn't do that. But January 1st -- actually not even January 1st, but around December 27th, 28th, the SCANDIES ROSE always got ready to go to depart and would either go fish codfish or go fish opilio right after that. And we primarily erred -- not erred, but we primarily focused on opilio, we'd like to get a quick start on opilio and neglected cod for several years.*[137]

4.2.183. ADF&G set the quotas for the BSAI opilio crab fishery and determine the annual catch limit (ACL). The crab fisheries in the Bering Sea and Gulf of Alaska are co-managed by the State of Alaska and NMFS, under the provisions of the Federal Fisheries Management Plan. The NMFS website contains the following information on Pacific cod fishing

> *Managed under the Bering Sea/Aleutian Islands Groundfish Fishery Management Plan:*
>
> *10.7 percent of the allowable catch is allocated to the community development quota program, which benefits fishery-dependent communities in western Alaska. The rest is allocated among the various fishing sectors based on gear type, vessel size, and ability to process their catch.*
>
> *In the Gulf of Alaska, Being Sea, and Aleutian Islands:*
>
> *Fishermen must have a permit to participate in these fisheries, and the number of available permits is limited to control the amount of fishing.*

[137] Ms. [redacted] MBI Hearing Transcript, Pg. 29

Managers determine how much Pacific cod can be caught and then allocate this catch quota among groups of fishermen. Catch is monitored through record keeping, reporting requirements, and observer monitoring.

Fishermen must retain all of their Pacific cod catch.[138]

4.2.184. The opilio crab season opened on October 15 each year and did not close until the end of May the following year.

4.2.185. The Pacific cod season for 2020 started January 1, 2020 and ended on January 15, 2020. In testimony, when asked about the closure date and the length of the fishery season, the representative for NOAA's National Marine Fisheries Service commented that the 15-day length was the same as it had been in 2019 and is "the shortest season that we've seen for the fishery."[139]

And when a former crewman and experienced fisherman was asked about the rationale for going cod fishing before fishing crab, he replied to a question

Q: Do you have an understanding why a vessel like the SCANDIES ROSE might want to fish when it could in the cod season and then shift over to opilios?
A. Yes. It's a pretty common practice. They do it so that the boat has a catching streak. This is in anticipation of the cod fishery eventually going rationalized with the quota system like crab is as opposed to being a (indiscernible) fishery.[140]

4.2.186. The SCANDIES ROSE had obtained the appropriate permits for Pacific cod and crab.[141]

Coast Guard Response Resources

4.2.187. Coast Guard SAR readiness and mission response standards are published in COMDTINST M16130.2F and provide resource planning guidance to Coast Guard District and Sector Commanders, who are responsible for the basing or staging of SAR units and assets. In making their resource deployment decisions, they must take into account resource constraints, environmental considerations and other factors.

4.2.187.1. Bravo-0 means an aircraft will launch within 30 minutes of notification of distress with an on-scene time within 90 minutes after launch.

4.2.187.2. Other statuses like Bravo-2 mean an aircraft will launch within two hours of first notification of distress. Bravo-2 readiness does not include a requirement for the aircraft to arrive on-scene within a certain timeframe.

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[138] Website link: https://www.fisheries.noaa.gov/species/pacific-cod
[139] Ms. [redacted] MBI Hearing Transcript, Pg. 975
[140] Mr. [redacted] MBI Hearing Transcript, Pg. 704
[141] https://www fisheries noaa.gov/sites/default/files/akro/1920cratfcvp.csv

4.2.187.3. Per the D17 SAR Plan,[142] Air Station Kodiak was required to maintain, to the maximum extent possible, at least one Bravo-0 MH-60 helicopter and at least one Bravo-0 HC-130.

4.2.187.4. During times of inclement weather affecting the runways in Kodiak, Air Station Kodiak has a standard operating policy to relocate their HC-130 to JBER in Anchorage, AK, where they assume a Bravo-2 status. Once alerted to launch, these aircraft provide long-range communications relay capabilities for other Search and Rescue Units (SRUs) on scene. This is what happened in preparation of the predicted winter storm front during the time of this accident. The aircraft were relocated to JBER on December 31, 2019 where they assumed Bravo-2 status.

4.2.188. The HC-130 is a fixed wing aircraft and serves as the Coast Guard's long-range patrol and search and rescue asset. The HC-130 as an on-scene command-and-control platform with extended loitering capabilities as well as performing various missions, including maritime patrol, law enforcement, search and rescue, disaster response, and cargo and personnel transport. The HC-130 is fitted with a powerful multimode surface-search radar and a nose-mounted electro-optical/infrared (EO/IR) device combined with an Airborne Tactical Workstation and military satellite communications.

Figure 59 – Image of a Coast Guard HC-130 which is similar to the aircraft used in the search operations. (Source Coast Guard)

4.2.189. The HC-130's operating capabilities are shown in the figure below.

[142] D17 SAR Plan, CGD17INST 16104.1(series)

One HC-130J HERCULES (Aircraft #2006)		
Engines	**4**	**4,910-hp Allison T56-A15 turboprop engines**
Operating Environment	**All weather, day/night**	
Maximum Speed	**362**	**Knots**
Cruise Speed	**280**	**Knots**
Service **Altitude**	**39,000**	**Feet**
Range	**5,200**	**Nautical Miles**
Crew Size	**6**	**Persons**
Operating Restrictions and Notes		
Aircraft was operating within operating limits the night of the accident. Due to weather conditions, the HC-130 aircraft number 2006 launched from Joint Base Elmendorf-Richardson, Anchorage, AK.		

Figure 60 – Capabilities of a fixed wing aircraft that was used in the Coast Guard's search and rescue operation after the sinking of the SCANDIES ROSE. (Source Coast Guard)

4.2.190. The MH-60, also known as a Jayhawk, is the Coast Guard's longer range rotary wing aircraft. The MH-60 employs full night-vision-device capability. Primary navigation is accomplished through blended GPS and inertial navigation system receivers. In addition to a rescue hoist – rated for 600 pounds – the Jayhawk is equipped with a heavy-lift external sling with a capacity of 6,000 pounds. The MH-60 carries sensors and equipment for SAR missions, law enforcement, and homeland security missions. Its primary mission in this case was to search for and recover survivors. The forecasted weather and the distance to the LKP of the SCANDIES ROSE would require additional flight planning which included taking on additional fuel for the search mission to a position south of Sutwik Island. The night flight with blowing snow and low ceiling hampered the pilot and co-pilot's night vision equipment and adverse weather conditions, at times, requiring both pilots to control the aircraft in order to maintain the safety of the aircraft and manage the risk to the crew and mission.

Figure 60 – Image of a Coast Guard MH-60, similar to the types used in the search operations. (Source Coast Guard)

The MH-60 operating capabilities are shown in the figure below.

Two MH-60 Jayhawk Helicopters (Aircraft #'s 6038, 6037)		
Engines	**2**	**1,560-shp General Electric T700-GE-401C turboshaft engines**
Operating Environment	**All weather, day/night**	
Maximum Speed	**180**	**Knots**
Cruise Speed	**120**	**Knots**
Maximum Altitude	**13,000**	**Feet**
Range	**700**	**Nautical Miles**
Crew Size	**4**	**Persons**
Hoist Capable	**Yes**	
Rescue Swimmer in Crew	**Yes**	
Operating Restrictions and Notes		
Operating within operating limits on the accident night. MH 60T aircraft number 6038 rescued the survivors and returned to Air Station Kodiak, AK with the Auxiliary power Unit switched off to conserve fuel.		

Figure 61 – Capabilities of the helicopters used in the Coast Guard's search and rescue operation after the sinking of the SCANDIES ROSE. (Source Coast Guard)

4.2.191. Air Station Kodiak is assigned four MH-65 aircraft. Short range recovery aircraft satisfy the International Civil Aviation Organization/IMO SAR equipment definition of Helicopter-Light. In optimal conditions, these aircraft have a 100 NM action radius and a capacity for evacuating one to five persons. The Coast Guard MH-65 helicopter can land on any cutter with a flight deck and can perform helicopter inflight refueling from those ships to extend range. With the limited range, this aircraft was not a viable option for this SAR response because of the transit distance to the search area.

Figure 62 – Image of a Coast Guard MH-65. (Source Coast Guard)

One MH-65D (Aircraft # 6590)		
Engines	**2**	**Two 835-shp turboshaft engines**
Operating Environment	**All weather, day/night**	
Maximum Speed	**175**	**Knots**
Cruise Speed	**120**	**Knots**
Maximum Altitude	**10,000**	**Feet**
Range	**375**	**Nautical Miles**
Crew Size	**4**	**Persons**
Hoist Capable	**Yes**	
Rescue Swimmer in Crew	**Yes**	
Operating Restrictions and Notes		
The MH65 deployed to the USCGC MELLON. It was not mission capable due to a maintenance issue, and was on deck at the Dutch Harbor Airport (PADU). Due to this, it was unable to embark to the MELLON.		

Figure 63 – Capabilities of one of the aircraft that was attached to the CGC MELLON but unavailable for the Coast Guard's search and rescue operation after the sinking of the SCANDIES ROSE. (Source Coast Guard)

4.2.192. The CGC MELLON is a high endurance vessel that is 378 ft in length. The Secretary-class cutter is ideally suited for long-range, high-endurance missions, and for fulfilling the maritime security role, which includes drug interdiction, illegal immigrant interception, and fisheries patrol.

Figure 64 – USCG Cutter MELLON (WHEC-717) in an undated photo. (Source Coast Guard)

4.2.193. The CGC MELLON's operating capabilities are listed in the figure below.

USCGC MELLON WHEC 717		
Engines	**2**	**Diesel engines 3,500 bhp each / Two gas turbine engines**
Shafts	**2**	**36,000 Shaft Horsepower**
Length Over All	**378 Feet**	
Displacement	**3400 Tons**	
Operating Environment	**All weather, day/night**	**Sea State: N/A**
Range and Speeds: 2,400 nautical miles at 29 knots or 9,600 miles at 19 knots (on gas turbines); 12,000 nautical miles at 14 knots (on diesels)		
Crew Size:	**167**	
Length Over All	**378 Feet**	
Operating Restrictions and Notes		
Vessel was operating within operating limits on the accident night. The USCGC MELLON transited to search area running at times on one of two gas turbine engines due to weather conditions. During search operations had to stop active search operations to break ice that had accumulated on the forward part of the ship.		

Figure 65 – Capabilities of the CGC MELLON used in the Coast Guard's search and rescue operation after the sinking of the SCANDIES ROSE. (Source Coast Guard)

Radio Communication Gaps

4.2.194. The Coast Guard VHF radio system in Alaska, or R21 AK,[143] was funded through a Coast Guard Authorization Bill to upgrade the VHF-F communications system the Coast Guard uses in the Alaska region. The system was upgraded in the early 2010s with a newer radio and electronics package to include DSC and three additional remote fixed facilities were added to the system to increase the coverage area. However, 20 remote fixed facilities, network and backbone upgrades, microwave consolidation, power generation including generators and solar panels, and shelter/hut upgrades that were originally in the bill were removed and not included in the upgrades that were authorized. This left a significant shortfall in the capabilities and sustainment of the system. As a result, the R21 AK system still depends on obsolete equipment that includes 1980s era network technology such as microwaves that are past their end of service life and generators lacking supervisory control and data acquisition, all of which are unsupported by the current Coast Guard system. Mountain top huts containing critical equipment like generators, electronics, and other critical Information Technology equipment are in disrepair with long-standing upgrade and repair requests. Propane and other fuel systems that power these systems are left empty due to the logistics of refueling at high altitudes, in remote mountain-top regions, leaving the equipment inoperative. The SCANDIES ROSE accident location was not within a current R21 AK coverage area.

[143] Rescue 21 Alaska (R21 AK) is the VHF radio communication system the Coast Guard utilizes in Alaska.

4.2.195. Command Center watchstanders used the Probability of Survival Decision Aid (PSDA) software within the SAROPS program to calculate predicted survival times from the effects of hypothermia during cold-water immersion. Coast Guard rescue forces calculated that the water temperature was 38° Fahrenheit and air temperature 10° Fahrenheit.[144]

4.2.196. Using the latest version of the PSDA, the survival times were calculated for an individual with and without a survival suit on. With a survival suit on, the functional time was 3.84 hours and predicted cold survival time was 8.15 hours, assuming crewmembers were wearing a clothing ensemble of shirt, sweater, and plastic polyvinyl chloride (PVC) rain suit. Without a survival suit on, the functional time was 1.73 hours and predicted cold survival time was 6.23 hours, assuming crewmembers were wearing a clothing ensemble of shirt, sweater, and PVC rain suit. However, the effects of sudden cold-water immersion below 68° Fahrenheit can result in a respiratory reflex resulting in a rapid loss of life. The survival times in the PSDA are based on entering the water slowly in a non-catastrophic marine accident such as a planned event like abandoning ship in a case where a procedure is carried out calmly and methodically.

4.2.197. Functional Time (core temperature above 34° Celsius or 93.2° Fahrenheit) is the length of time (hours) during which an individual may participate in self-rescue or take actions that will enhance survival/protection from exposure. Cold Survival Time (hours) is the time it takes for the core temperature to drop to 28° Celsius or 82.4° Fahrenheit. Below that threshold, the probability of death due to hypothermia significantly increases. Proper wearing of a properly sized immersion suit helps to protect the wearer from sudden immersion shock, can reduce the effects of hypothermia, and increase chances of survival.

5. Analysis and Opinions

5.1. Voyage Planning

5.1.1. Weather

5.1.1.1. Pre-departure Weather Assessment and Strategy to Reduce Risks

The Captain and the crew were fully aware of the weather forecasted along the route on the accident voyage and they discussed the weather prior to departure. The forecasts called for gradually worsening weather along the intended route with a gale warning for Shelikof Strait. That gale warning indicated winds of 35 kts, 9 ft seas, and presence of freezing spray in the forecast area. This forecast was available at 3:39 p.m. on Monday, December 30, 2019, the day of departure. There were also forecasts available for further along the route, including the area in the vicinity of Sutwik Island that forecasted the same sustained high winds and seas as well as freezing spray warnings. One of the most important aspects to incorporate in voyage planning was the Captain's considerable experience in the dangerous Alaskan weather. That experience would serve as input into the planning and decision making for the voyage. Some examples would be how ice

[144] CG Exhibit 008

might form on the vessel, the weather's effects on list, fuel consumption, and how the plan would manage wind and sea conditions to minimize risk to personnel, including seasickness and fatigue. That extensive seagoing experience could have been a critical element in assessing and reducing all of the risks to the vessel and crew.

The voyage would take the SCANDIES ROSE out of Kodiak, then north up Whale Pass and then into the Shelikof Strait where the SCANDIES ROSE would settle on a generally southwesterly course. The survivors indicated that the predicted hazardous weather was discussed informally amongst the crew and Captain prior to departure on multiple occasions. However, there is no evidence that subsequent discussions took place between the Captain and the crew reassessing the weather in the early stages of the voyage or at any regular interval during the voyage. In addition, there is no evidence that any discussion took place between the Captain and the crew about seeking shelter or conducting weather avoidance maneuvering should ice begin to form as was predicted in the heavy freezing spray weather warnings which were included in the later forecasts. In deep sea shipping, this team planning is called Bridge Resource Management (BRM) and it is specifically used so that all of the persons responsible for operating the vessel as the navigation watch are aware of the plans for a voyage and get the opportunity to give input and voice their concerns for the safety of the voyage. There is no evidence that this was done onboard the SCANDIES ROSE on the accident voyage.[145]

5.1.1.2. Weather Forecasts and Weather Information to Plan the Voyage

The NWS issues freezing spray warnings and forecasts several days in advance of predicted conditions, understanding that mariners use this information to make pre-planning voyage decisions. A wide variety of weather forecasts, actual observations, and related weather information were available to Captain [redacted] as a voyage planning tool prior to departure. He also decided to wait six hours for the tide before departure which gave him more time to assess the upcoming weather and make safety based decisions for the voyage.

The figure below is an example of one of the forecasts available. Reports from weather stations and weather buoys were also available.

[145] Bridge Resource Management is the effective management and utilization of all available resources, both human and electronic, by the navigation watch team to ensure the safe navigation of the vessel. The essence of BRM is a safety culture and management approach that facilitates communication, cooperation, and coordination among the individuals involved in a ship's navigation. BRM is required by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers. (Coast Guard Safety Alert 09-13, 9/30/2013)

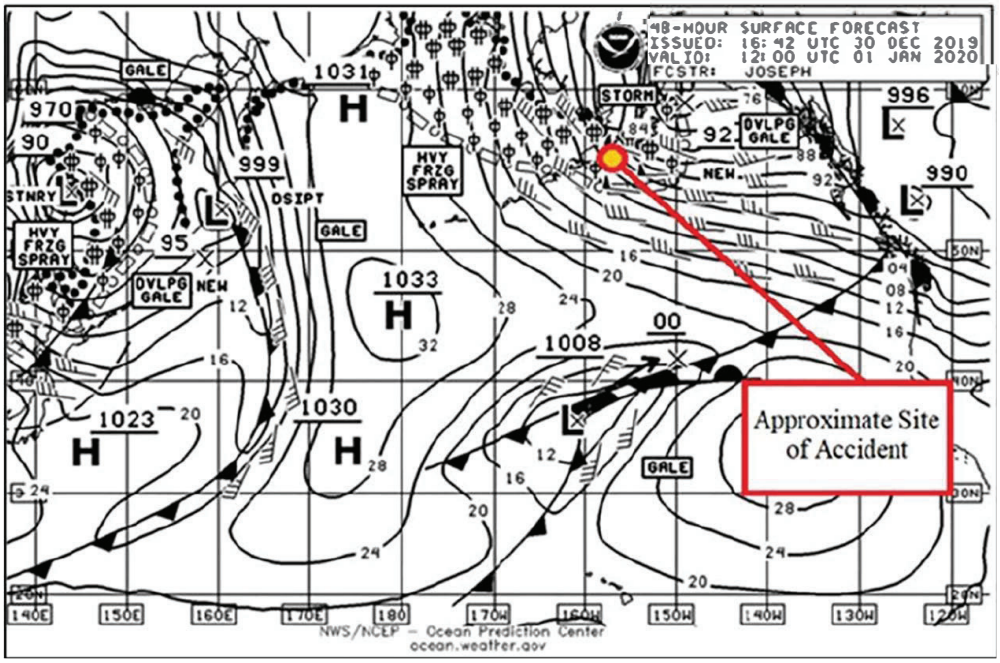


Figure 66 – NWS Ocean Prediction Center High Seas 48-Hour Surface Forecast for 07 42 a.m. AKST, December 30, 2019, thru 3 00 a.m. AKST, January 1, 2020. The storm is located in an area where the isobars are located fairly close to one another and relatively close to the word "storm." (Source CG Exhibit 028)

Figure 66 was developed by NOAA's Ocean Prediction Center (OPC) as a tool for mariners. This type of weather map is specifically designed to rapidly allow mariners to understand the weather in the area displayed. It uses standard symbols and format so a mariner can quickly identify dangers. Weather graphic products such as this one would have been available to the Captain of the SCANDIES ROSE via the internet onboard the vessel. In figure 67, below, which is a one of the weather charts that would have been available to the SCANDIES ROSE, the labels for heavy freezing spray (HVY FRZG SPRAY) are prominent and the symbols for the heavy freezing spray on the chart in the vicinity of the accident site along the SCANDIES ROSE voyage track. The actual weather chart does not explain what the freezing spray symbols are and there is no explanation of the amounts of freezing spray that those symbols represent. The NOAA website, which contains a glossary, provides an explanation of the symbols as well as the amounts of anticipated icing per hour for moderate and heavy freezing spray. The information from the glossary page of the NOAA website can be seen at the top of figure 67, below.

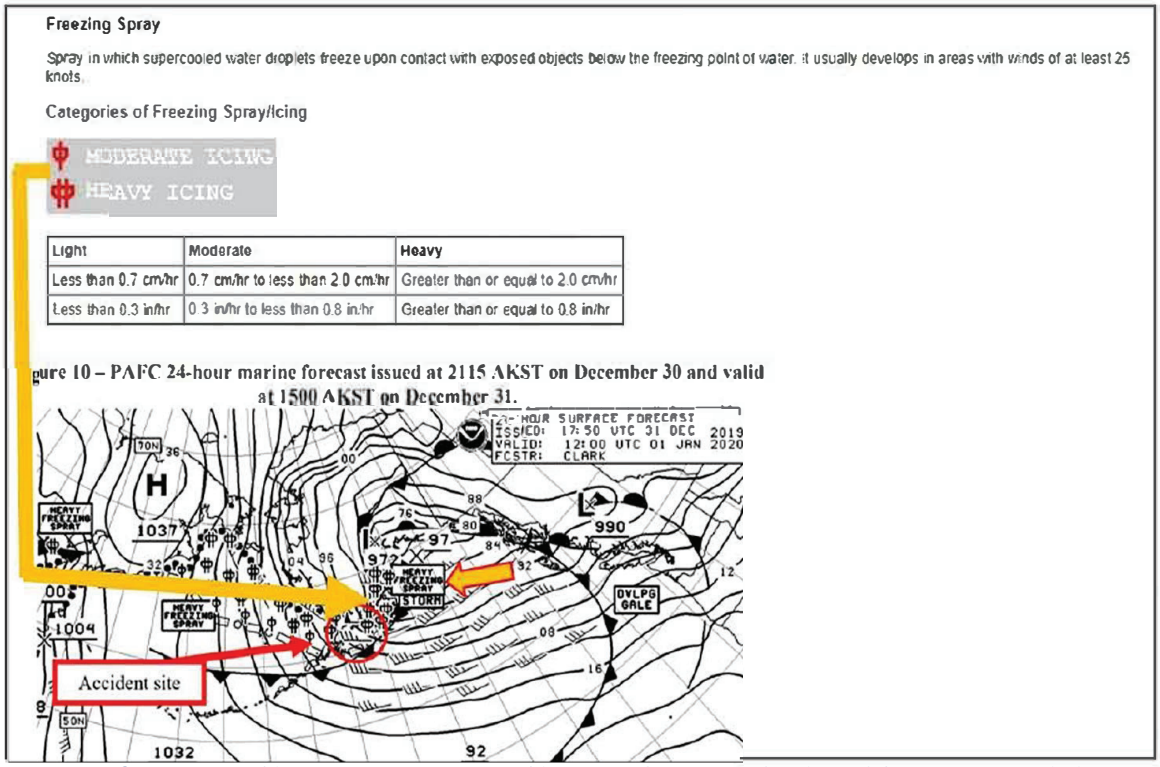


Figure 67 – The top section of this figure is an explanation of the terms and symbols used by the OPC for freezing spray which is contained in the information on its website. One the bottom of the figure is the 48 hour marine forecast issues at 9 15 p.m. on December 30, 2019 and valid at 3 00 p.m. AKST on December 31, 2019. The yellow arrow on the left shows the symbols for moderate and heavy freezing spray and the arrow on the right shows the label for heavy freezing spray, (HVY FRZG SPRAY). (Source OPC, with markups)

In text-based weather forecasts, the NWS uses "Headlines" in all capital letter type under the forecast time and date to highlight urgent information. This is intended to alert the mariner who is looking at the text-based product to the specific hazard, be it heavy freezing spray or other dangerous weather. Once the forecast is produced, it can be distributed to the mariner as a text based product available on the internet or it can be broadcast over the radio. Forecasts delivered by voice radio broadcasts, unfortunately, do not have a means to emphasize the urgent weather "headline." An example of the text forecast with headline is provided in figure 68, below.

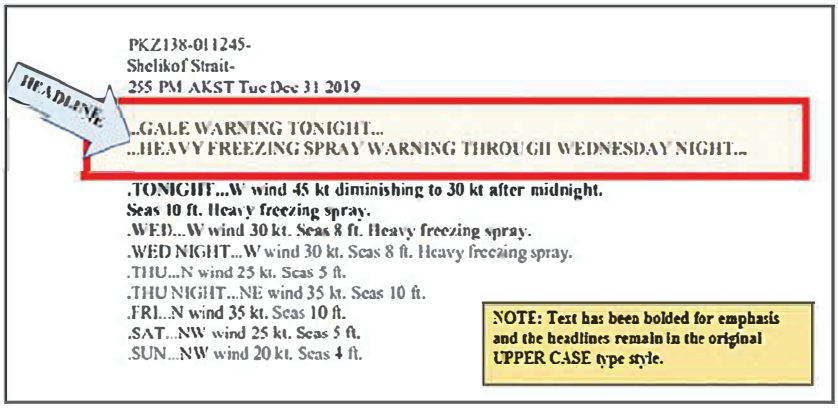


Figure 68 – All capital letter text in the graphical forecast, the "headline" for the urgent information is in the red highlighted box. NWS forecast for the period 2 55 p.m. on December 31, 2019 for the area in the western end of the Shelikof Strait where the SCANDIES ROSE could attempt to seek shelter. (Source NWS, with markup)

In looking at the NWS forecasts, there is no evidence that the crew, or fishing vessel crews in general, knew the difference between a freezing spray forecast and a heavy freezing spray forecast and the greater danger of the heavy freezing spray for rapid and substantial accumulation of ice on the vessel and on the crab pot stack.[146]

5.1.1.3. Weather Instruments

The SCANDIES ROSE Captain reported wind speeds of 60-70 kts during last hours of the voyage when he spoke to other fishing vessel captains on the tag phone. The 2019 Condition and Valuation Survey lists an anemometer as part of the vessel's equipment inventory. The wind speed indicator was mounted on the after bulkhead of the SCANDIES ROSE wheelhouse. There is no evidence that the vessel was equipped with a device that accurately measures wind direction. Since the SCANDIES ROSE was proceeding at speeds of approximately 6 kts and the winds were in excess of 45 kts, the anemometers relative wind speed would still have provided a valuable data to inform the captain and crew driving the vessel of the potential impacts of the wind.

The SCANDIES ROSE was also equipped with a barometer and a tide calculation computer. The barometer would have been available to give the crew information as to changes in atmospheric pressure which would signal the presence of changes in weather such as nearing a low pressure system and the more forceful winds that might be encountered in that kind of weather system.

During the accident voyage, all available data regarding the sea heights, and speed and direction of winds were estimates based on the experience of the crew on board the vessel. In the case of the final report of 60-70 kt winds, that report was made during darkness with fleeting illumination by the small amount of moonlight and is believed to be an estimate of the wind speed. It could have been an observation if the Captain consulted the wind speed indicator. Sea height at the rescue time, approximately four hours after the sinking, was determined to be approximately 30 ft with the helicopter's up and down motion observed on the radar altimeter trying to hold the aircraft steady during the survivor rescue. The Coast Guard's factual portion of the D17 SAR Case Review Extract indicates that the weather at the rescue scene was

> *Weather on scene was seas 20-30 feet, winds 35-50 knots, cloud ceiling varying from 200-500 feet above ground level (AGL), rain/ snow, heavy at times, water temp 38°F, and air temp 10°F.*[147]

If the wind indicator, barometer, and thermometer were functioning correctly they should have given a continual readout of those values to a person standing the navigation watch enabling them to make data driven decisions. There was no testimony from either of the two survivors that Captain [redacted] instructed them to monitor the weather broadcasts, weather information available on the internet, wind speed, barometer, or temperature

[146] https://ocean.weather.gov/product_description/keyterm.php
[147] CG Exhibit 078, CG SAR Review

instruments and notify him of specific changes which is critical to the safe operation of any vessel.

5.1.1.4. Weather Applications

Commercial fishermen on vessels of the size and tonnage of the SCANDIES ROSE are not required to take any weather training courses. A mariner sailing on an oceans route and who holds a CG issued deck officer credential will normally have received some form of weather training in their career. Commercial fishermen have to rely on the same weather products that credentialed mariners would, such as receiving textual and graphical reports via radio or internet messages or "Navtex" messages. Testimony from several witnesses shared insight on how fishermen have used readily available third party tools in order to supplement, or in many cases, replace the typical marine weather reports. One third-party tool that was discussed in testimony and used on the accident voyage was an application, Windy®.

The Windy® application is reliant on internet, cellular or Wi-Fi connectivity to be updated. If a fisherman departs port with one report on their software application, that information will not be updated unless the vessel has satellite internet capability or the vessel gets connectivity for wireless devices. Based on interviews and photographic evidence, there is reason to believe that the SCANDIES ROSE had internet but not with the bandwidth that land based internet users enjoy. The two survivors both testified that they did not know how to access this internet onboard the SCANDIES ROSE, so they were unlikely to be able to access more updated Windy® information during their navigation watches.

Other witnesses, who work as fishermen, referenced the weather application Windy® as their primary source for weather, stating that it is simply more user friendly than the National Weather Service products. This application simply takes data provided from the NWS weather model and plots it in the application. The software designers for this weather application do not forecast the weather. Windy® and similar weather applications, do not compare models (unless one pays for the premium version, and even then, it looks like the user still has to interpret what all of that information means). The free version only graphs the output from the most recent run from one weather model. Just from that screen image, a user gets less information than what is contained in a typical NWS forecast. If an individual user is savvy in navigating through these applications, he or she might flip through the four models it offers and see if the models differ from one another but most people do not know that feature exists.

Weather applications such as these are taking raw data out of one model and plotting it. The fancy graphical output may lead a user to believe that the forecast may be of better quality and more accurate than a NWS or OPC forecast, but that is not the case because the resolution is set by the model. The application can be deceptive and if the next model run is substantially different, Windy® just plots the output. No consideration is given for outliers or bad data that could be contained in the data used to create the image that the mariner sees. This weather application also defaults to the European weather model, which may not be the optimal choice for many locations like Alaskan waters. The

European model is significantly different from the U.S. based models.

The surviving crew and the personnel working on commercial fishing vessels interviewed by the Marine Board revealed the prevalent usage of the cell phone application, Windy® to ascertain the current and forecasted weather along the intended routes to fishing grounds. A person looking at this application or similar applications on a handheld wireless device such as a cell phone connected to the world wide web would see user friendly graphic, chart based images depicting the weather in colored layering over a sublayer containing a chart or map. Figure 69, below, shows an example of the type of information that is available when the application is accessed.

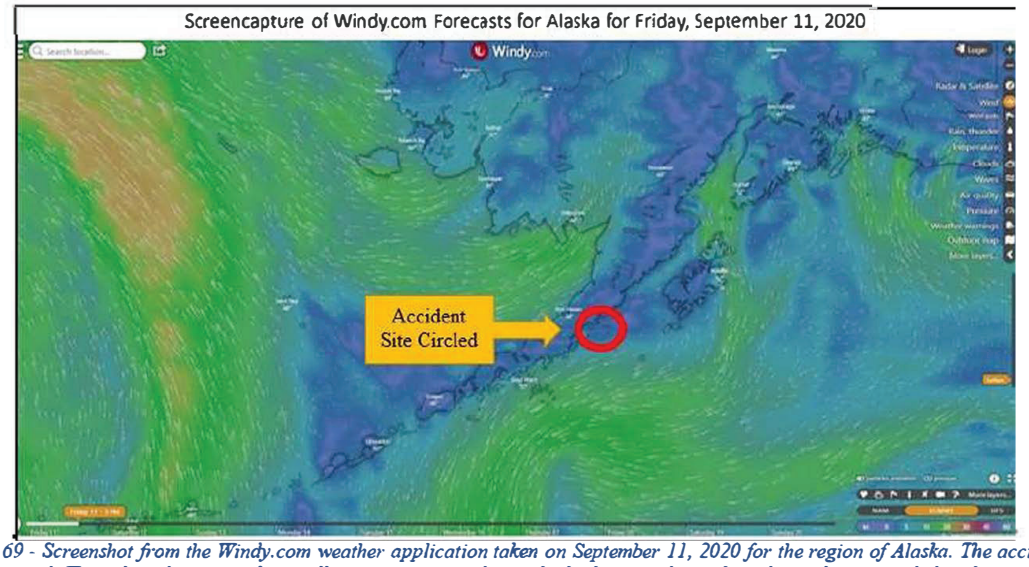


Figure 69 - Screenshot from the Windy.com weather application taken on September 11, 2020 for the region of Alaska. The accident site is circled in red. The colors deepening from yellow to magenta indicate the highest wind speeds and a scale is provided in the application in the lower right corner of the screenshot. (Source CG Exhibit 026, with markup)

The application display will show winds as moving arrows showing directional wind flow. The Windy® application has multiple layers that could prove beneficial to a mariner and the user can look ahead to times in the future to see what the weather will be doing. The user can select a time in the future and see the forecasted conditions. However, there was no layer or feature for a mariner to examine text-based forecasts that were identical to the products produced by the NWS which would include freezing or heavy freezing spray forecasts along with other urgent weather information.

The NWS forecasts delivered via internet and over radio and available to all mariners for the time leading up to and during the accident voyage indicated a progressive increase in the danger of freezing spray leading to heavy freezing spray and a gale warning. At the time of the accident, the crew of the SCANDIES ROSE would not have known that the Windy® application would not warn them of the heavy freezing spray and the associated text based "Headline" indicating urgent information. If Captain [redacted] relied heavily on the information provided by the Windy® application and not the NWS forecasts, he may have missed critically important details in the weather forecast information that the SCANDIES ROSE would be sailing through the heavy freezing spray zones.

Throughout the course of this investigation, the survivors and numerous other commercial fisherman spoke about the user-friendly interface of Windy® being the predominant reason it was utilized over information directly from the NWS. The use of a convenient application that supplies easily understood, applicable weather information in a graphical form with updated weather and warnings of urgent weather information is beneficial to mariners.

5.1.1.5. The Overland Method Model and/or NOAA OPC's Freezing Spray Website

During the Coast Guard's MBI Hearing, a number of fishing vessel captains were asked if they were aware of the experimental freezing spray website created by the NOAA OPC which provides vessel icing information based on the Overland Method Model. All of the witnesses that were asked were unaware of the website and information on vessel icing that site provided. Given their testimony, there is no evidence that, at the time of the accident, the SCANDIES ROSE or other fishing vessel operators in Alaska interviewed used the NOAA experimental freezing spray website.

The Overland Model is a mathematical algorithm that is used to predict icing based on a number of environmental factors. Wave-ship-interaction generates sea spray, for example, when a vessel hits the sea waves and swell provides larger spray amounts than the finer sea spray blown off the white caps of the waves. The Overland Model identifies this as the most important source of water which would contribute to ice freezing on vessels and then accumulating ice in dangerous icing events. Most models estimate the amount of ice accumulation by taking into account how much spray would be produced by the seas slapping the hull of the vessel and a shower of sea spray is generated, coating the surfaces of the vessel, coupled with the relative rate at which that water would freeze on a solid surface.[148] If the NOAA OPC experimental freezing spray website became fully operational and easily available, then access to that information would be beneficial to mariners operating in areas subject to freezing spray.

5.1.1.6. Accident Voyage Trackline Deviation

Once the SCANDIES ROSE settled onto the generally southwest course down the Shelikof Strait, the vessel's speed fluctuated from between 7-8 kts with some speeds approaching 9 kts. As the voyage continued, the vessel speed dropped to between 6 and 7 kts. Until the final course change to starboard at approximately 9:45 p.m. on the night of the accident, the vessel held a steady course with no significant changes of course or speed to suggest the crew attempting to reduce the risk of ice accumulation on the vessel. The dangers posed to the vessel and crew were the gale force winds, heavy seas, and, more importantly, the heavy freezing spray that the vessel began to encounter. Vessel icing was observed sometime between 2:00 a.m. to 6:00 a.m. on the morning of December 31, 2021 and still course and speed were maintained despite the risk. In

[148] Samuelsen, E. M. (2018). Ship-icing prediction methods applied in operational weather forecasting. *Quarterly Journal of the Royal Meteorological Society*, *144*(710), 13–33. https://rmets.onlinelibrary.wiley.com/doi/10.1002/qj.3174

examining the vessel's AIS data, there is a time from 6:20 p.m. until 7:20 p.m. on the accident day when the vessel yawed on its base course for unexplained reasons. During the course of this investigation, there was no evidence or testimony as to the exact purpose for these very slight heading changes. For that reason, it is unknown if these heading changes were intentional to counteract on-scene conditions or if they were due to natural forces encountered by the vessel without manual adjustments to counter them. In this case, it could indicate worsening weather or icing conditions. Figure 70, below, shows that segment of the AIS track of the SCANDIES ROSE.

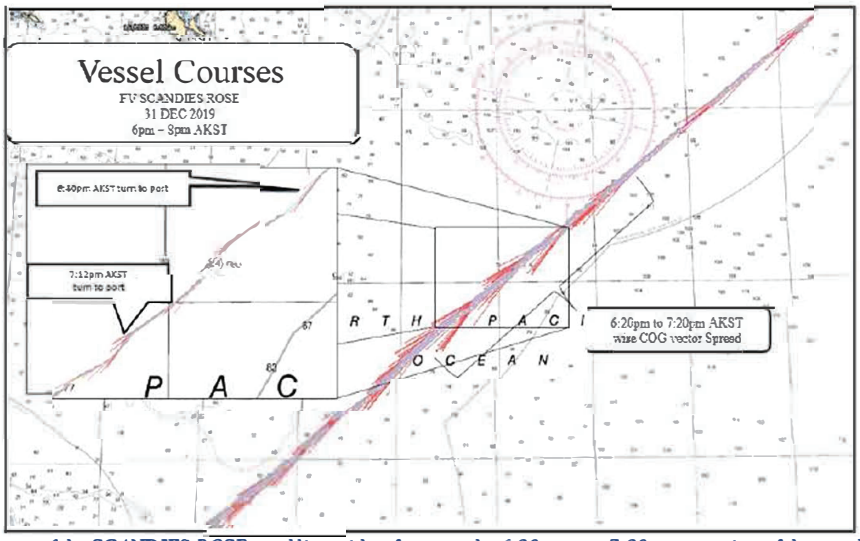


Figure 70 – Segment of the SCANDIES ROSE trackline with a focus on the 6 20 p.m. to 7 20 p.m. portion of that trackline showing a pronounced yawing which is a greater deviation from the base track than on any earlier portion of the voyage. Course Over Ground (COG). (Source Coast Guard)

Published guidance on reducing the accumulation of ice on a vessel include reducing the freezing spray by reducing speed, changing course, seeking shelter, or running on an opposite course to reduce the relative wind and the accompanying freezing spray. The more obvious strategy, in this case, would have been to seek shelter from the dangerous conditions earlier during the voyage.

5.1.2. Route Taken by the SCANDIES ROSE

5.1.2.1. SCANDIES ROSE's Route Down the South Side of the Alaska Peninsula and the Local Weather Conditions

The track of the SCANDIES ROSE would take the vessel down the south side of the Alaska Peninsula towards Sutwik Island as illustrated in the figure below. The Shelikof Strait is a commonly used route for vessels transiting this area. As it travelled along the track, the vessel began to get closer to the Alaska Peninsula landmass off the starboard side and, with it, the general winds blowing towards the vessel from across that landmass. The shoreline to the north is indented with numerous bays and inlets bordered by high mountains which can funnel and intensify the wind into a local condition called a "Williwaw," a sudden violent squall blowing offshore from the mountainous coast.

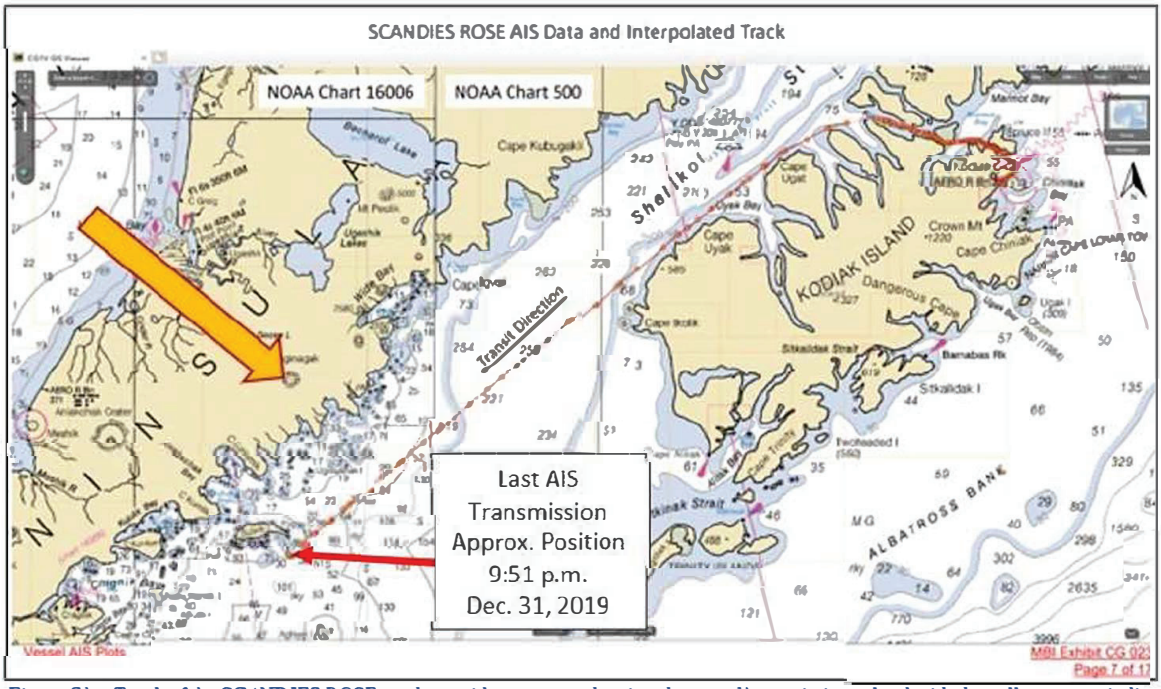


Figure 71 – Track of the SCANDIES ROSE on the accident voyage showing the vessel's proximity to land with the yellow arrow indicating the general direction of the wind. (Source CG Exhibit 023, with arrow as markup)

The captain of the PACIFIC SOUNDER testified about travelling along that coastline in the hearing

> *There is no area worse than where they were at for icing. It's -- I've called it the freezer hold of hell, because the problem is, if you get a westerly or a northwest coming through the mountains of Chignik, there's glaciers all over that. And you get -- a 30- to 40-knot wind comes across that mountain and it picks up all this fresh water, and this cold, cold water, and it turns into ice crystals. Then, when it comes down, it hits the hot water, and the ice -- I've never iced up so bad in my life as I've iced up in that area, within 50 miles of where that boat went down.*

5.1.2.2. Refuge From Heavy Weather Along the Route

Travelling along the vessel's planned course, there were many opportunities for the Captain of the SCANDIES ROSE to make a decision for the vessel to duck into a place of refuge to clear ice safely or to stop and prevent the further accumulation of ice as well as to rest the crew. Incorporating these places of refuge in voyage planning would have included established waypoints to allow for timely decision making. Without having done this, he could not respond fast enough to the rapidly worsening conditions and safely reach shelter. Other fishing vessel captains had taken that opportunity to ensure the safety of the crew and the vessel. The majority owner of the SCANDIES ROSE and an experienced captain who was running the AMUTULI ahead of the SCANDIES ROSE talked about the availability of seeking shelter in his interview

> *There are literally hundreds of places from Kodiak to, in a northwest wind, you're going down the, you're running southwest down the Alaska Peninsula. You've got*

bays every, you know, couple miles. You know, there's a bay or an indent or a bight [sic] *where you could drop the pick. It's, and since he went out Shelikof and went down the left side of the island, you know, he would have had to cross over to the mainland. And then he would have had any number of places to hide.*[149]

Other captains who testified at the hearing were later queried about the availability of anchorage locations based on the prevailing winds on the route that the SCANDIES ROSE transited. Based on the information they provided, the figure below identifies several of the potential places of refuge along the route.[150] There were a number of potential safe and protected anchorages along the route that Captain [redacted] did not take advantage of for the safety of the vessel and crew.

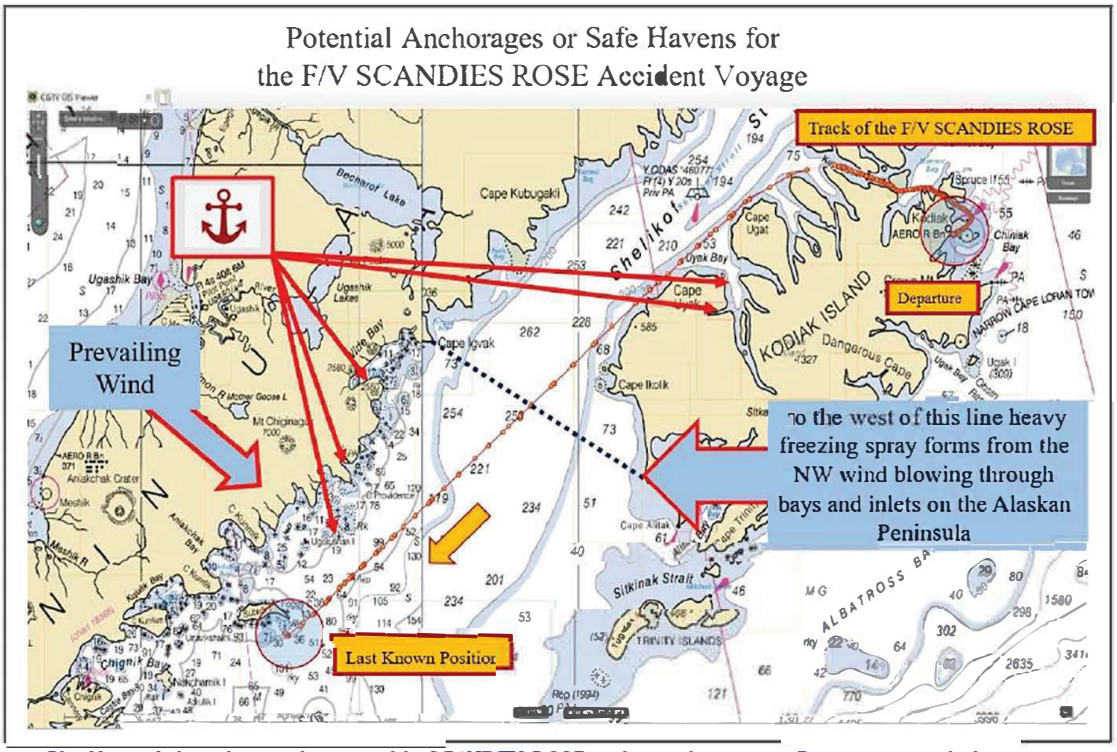


Figure 72 – Nautical chart showing the route of the SCANDIES ROSE on the accident voyage. Positions are marked representing reportedly good anchorages in northwest winds similar to the weather the SCANDIES ROSE was experiencing on the accident voyage. Other bays or inlets along the track were reported to offer poor anchor holding ground in the NW winds the SCANDIES ROSE encountered. To the southwest of the blue dotted line mariners would be expected to experience heavy freezing spray accumulation depending on the weather conditions. The numerous inlets on the south side of the Alaska Peninsula funnel the wind, increase its velocity and can rapidly increase the icing effects on a vessel. (Source Coast Guard)

5.1.2.3. Comparison To Other Fishing Vessels Heading West From Kodiak

To determine what the impact of the weather would be on other vessels, the investigation examined evidence in the form of testimony and AIS tracking of vessels in the area starting on December 29, 2019. In testimony, a number of vessel captains discussed leaving earlier based on their individual plans and fishing schedules.

[149] Captain [redacted] CG Exhibit 132, Pre-Hearing Transcript, Pg. 102
[150] CG Exhibit 137, Shelter and Anchorage Correspondence Post-SCANDIES ROSE Hearing

The majority owner of the SCANDIES ROSE, operating the AMATULI, experienced a rough ride and anchored to rest his crew well to the west of the accident site as he was considerably ahead of the SCANDIES ROSE's departure from Kodiak. When the vessel departed Kodiak the captain elected to run down the south side of Kodiak Island to take advantage of the protection of the island as he headed in a generally westerly direction. In another case, the fishing vessel RUFF & REDDY was also running ahead of the SCANDIES ROSE, having departed Kodiak earlier on December 29, 2019. Based on worsening weather conditions the RUFF & REDDY was experiencing, the captain of the vessel anchored in the shelter of Nakchamik Island in a position which was approximately 28 NMs to the west of the position where the SCANDIES ROSE sank. The RUFF & REDDY anchored there at approximately 6:00 a.m. on the accident day. In testimony, Captain [redacted] talked about the crew awakening him due to the weather

> *I would say we were probably 10 miles from Nakchamik Island when I was awoken and told that we were -- I believe it was my -- I'm sorry, I'm not great on the memory there, but I believe I was woken up, had time to get up there around, I guess it was probably 2:00 to 3:00 in the morning on the 31st. We were starting to build a little ice on the bow, northwest probably, I guess at the time, 25- to 30-knot winds. Started to accumulate ice on the bow and on the rails, and a little bit of spray on the pots there. So we decided to hold up on the lee side in Nakchamik. I knew the weather was coming. We were hoping to make it past Chignik Bay beforehand, but we knew that we had either Sutwik or Nakchamik to take cover in if we didn't make it that far. So we decided to anchor up, with ice beginning to accumulate on the boat.*[151]

5.1.3. Loading

5.1.3.1. Loading for the Accident Voyage

While the Captain of the SCANDIES ROSE was not on board for all pre-departure activities, he oversaw pre-departure loading operations and assigned crewmembers who were both experienced fishermen and were extremely familiar with the vessel having sailed her for multiple years and different fisheries. The crewmembers who directed the majority of the pre-departure operations loaded the pots on the vessel and took on fuel and water in preparation for a voyage. The crew loaded the sorting table on the top of the pot stack and took on approximately 15,000 pounds of bait in the forward bait freezers. They also took on stores and provisions for the crew as part of the loading operation. As the master of the vessel, Captain [redacted] was responsible for the entirety of the operation and verified the apparent sufficiency of the loading configuration based on his experience, and the tools he had available to him, including the 2019 stability instructions.

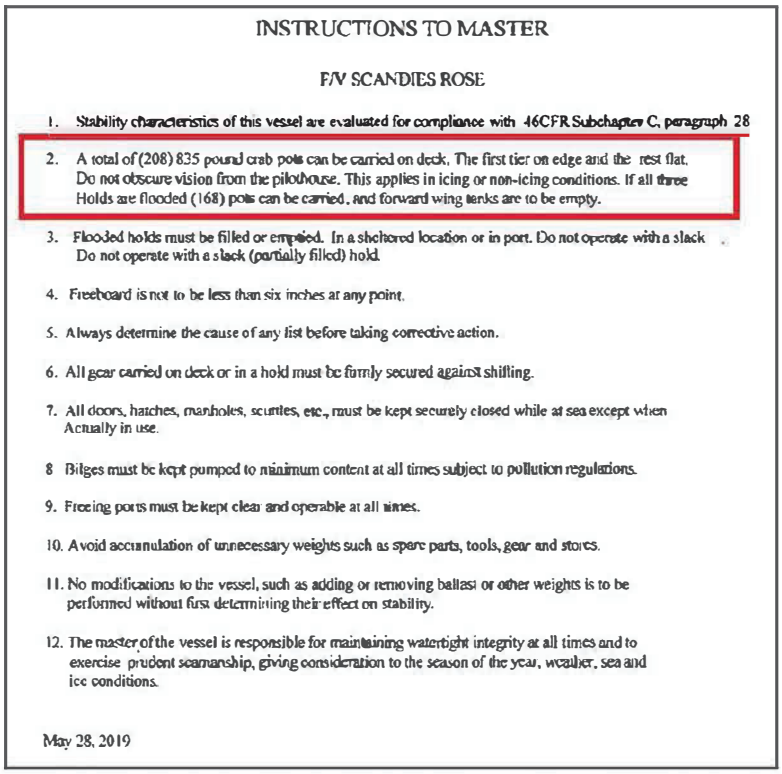
The Captain loaded the approximately 195 pots so that the vessel could maximize profit on the intended voyage. The reduction of the number of pots from the 208-maximum allowed to the final total of approximately 195 pots was most likely a decision to provide visibility while navigating. This reduction in pots from the maximum could have also

[151] Captain [redacted] MBI Hearing Transcript, Pg. 838

been the Captain's safety margin for the anticipated weather. The instructions to the master from the 2019 stability instructions contained this language: "Do not obscure vision from the pilothouse. This applies in icing or non-icing conditions."[152] That very statement is ambiguous and confusing, as lacks the clarity of detail as to whether the icing applies to visibility or the actual pot load. The stability instructions do not account for the size of the pots used during calculations and the Marine Board believes that the SCANDIES ROSE could not have safely carried 208 of the large pots used on this voyage.

Based on survivor testimony, tarping of the pot stack was discussed but the decision was made to not tarp the pot stack.

Figure 73, below, is a copy of the 2019 instructions to the master document that the Captain would have considered when directing his crew in loading fuel, water, provisions, and pots on deck.



INSTRUCTIONS TO MASTER

F/V SCANDIES ROSE

1. Stability characteristics of this vessel are evaluated for compliance with 46CFR Subchapter C, paragraph 28
2. A total of (208) 835 pound crab pots can be carried on deck. The first tier on edge and the rest flat. Do not obscure vision from the pilothouse. This applies in icing or non-icing conditions. If all three Holds are flooded (168) pots can be carried, and forward wing tanks are to be empty.
3. Flooded holds must be filled or emptied. In a sheltered location or in port. Do not operate with a slack Do not operate with a slack (partially filled) hold.
4. Freeboard is not to be less than six inches at any point.
5. Always determine the cause of any list before taking corrective action.
6. All gear carried on deck or in a hold must be firmly secured against shifting.
7. All doors, hatches, manholes, scuttles, etc., must be kept securely closed while at sea except when Actually in use.
8. Bilges must be kept pumped to minimum content at all times subject to pollution regulations.
9. Freeing ports must be kept clear and operable at all times.
10. Avoid accumulation of unnecessary weights such as spare parts, tools, gear and stores.
11. No modifications to the vessel, such as adding or removing ballast or other weights is to be performed without first determining their effect on stability.
12. The master of the vessel is responsible for maintaining watertight integrity at all times and to exercise prudent seamanship, giving consideration to the season of the year, weather, sea and ice conditions.

May 28, 2019

Figure 73 – SCANDIES ROSE's 2019 stability Instructions to the Master provided by the Naval Architect. (Source CG Exhibit 036, with Coast Guard mark ups)

5.1.3.2. Reliance on Stability Information

Captains typically rely heavily on stability instructions created for the master of a vessel, not the complicated tables and calculations contained in the bulk of a stability instruction booklet which can be many pages. The intent of a stability "Instructions to the Master" is to clearly articulate the most important safeguards for a vessel in terms of maintaining

[152] CG Exhibit 036

positive stability. In the case of the 2019 instructions, these were vague and lacking detail. Critically speaking, they relied on a flawed stability assessment of the SCANDIES ROSE.

The Captain was provided with the 2019 stability information which included "Instructions to the Master." These instructions were specifically designed to give the operator of the SCANDIES ROSE the stability information to ensure the safety and stability of the vessel. The specifics of those instructions and the contents of the 2019 stability information are examined and analyzed in other sections of this report.

Captain [redacted] was not a naval architect, nor had he attended any form of stability training course available to formally instruct him in the many facets of stability such as center of gravity, righting arm, wind heel, icing, severe wind/roll, freeing ports, and other critical elements to ensure the safety of a vessel such as the SCANDIES ROSE. Thus, the "instructions" were even more important to the critical decisions affecting the safe loading and operation of the vessel.

Post casualty, the stability instructions were examined by the Coast Guard's MSC. The investigation determined that as he loaded and prepared for the voyage, the Captain relied on this stability analysis and the documents that he had received that were prepared by the Naval Architect, a "Qualified Individual." Making the critical decision to proceed on the voyage after departing the dock with a gale warning and with a forecast going from freezing spray to heavy freezing spray, the Captain would not have been aware of some of the critical flaws in the 2019 stability analysis and documentation provided to the owner. Captain [redacted] was not present at the 2019 stability assessment to provide his experienced input, specific to the SCANDIES ROSE, to the attending Naval Architect developing the calculations and the guidance in the stability instructions.

Based on the "Instructions to Master" contents in the stability instructions, dated May 28, 2019, the downflooding point was never specifically addressed. As a result, it is unclear if the Captain knew what the critical downflooding points were. This is considered critical as it provides a clear point in which the heel of the boat would compromise the watertight integrity of the vessel and would initiate free communication with the sea, even if the vessel was fully intact.

The Naval Architect who created the report failed to identify those downflooding points[153] which impacted the stability calculations. Furthermore, the Naval Architect did not take the opportunity to discuss and explain the stability report and instructions with Captain [redacted] during or after the 2019 stability testing. This was a missed opportunity to identify any critical vessel vulnerabilities or inaccuracies in the stability instructions. The 2019 stability instructions were provided to the majority owner, who simply conveyed them to the Captain and did not seek the Captain's input on the completed instructions.

[153] The Naval Architect's failure to identify downflooding points was in addition to a number of other errors which impacted the stability report for the SCANDIES ROSE.

A more detailed analysis of stability is covered in section 5.4 of this report.

5.1.4. Navigation of the Vessel

5.1.4.1. Crew Navigation Watch Rotation

Based on an analysis of conflicting information, the Marine Board has determined that the Captain established a written watch list with one-hour watches for the crew and then he would stand a six-hour watch, then the rotation would commence again. This provided an opportunity for the crew to be off watch up to eleven hours, with the Captain off watch for six hours in a twelve hour period. It is not known what the precise watch times were as there were instances where watches seemed to start at times other than the times testified to by witnesses, and those start and stop times for watches were minor increments of not more than a half hour. During the off-watch periods the crew could rest, sleep, or perform any duties that were required of them while in the transit to the fishing grounds. This would have been a different scheme if the SCANDIES ROSE had reached the fishing grounds in the Bering Sea, where the vessel would have been engaged in crabbing.

Ultimately, survivor testimony suggests that the two crewmembers who had the least amount of experience with the vessel were back to back on the watch rotation. Though experienced fishermen, neither had sailed on the SCANDIES ROSE before nor served under the Captain to know and understand his expectations for the safe operation of the vessel. As the vessel departed on the voyage and in the worsening weather, the placement of these two men in the rotation lineup created a situation where there was a two-hour period with crewmembers unfamiliar with the unique characteristics for the SCANDIES ROSE, such as seakeeping qualities. The strategy of placing each of these crewmembers in slots between more experienced crew would have prevented this situation and spread the vessel experience to safeguard the vessel. The majority owner, an experienced and credentialed fisherman and mariner stated in testimony

> *I would just do that, and I would always leave -- in the logbook, I'd write down the watch schedule and who was going to do it so that I would space out experienced and less experienced people. And that, but that's just like a good practice, you know, bridge resource management, you know. Just, that's learning how to handle a crew, you know, and how you navigate safely from one point to another.*[154]

5.1.4.2. Standing Orders for the Navigational Watch

In testimony, persons who crewed the SCANDIES ROSE reported that the Captain may have maintained a written list of standing orders for the crew standing navigation watches. Below is an example of standing orders which are not dated and there is no way to know if these were the standing orders in effect on the accident voyage as the survivors did not see written standing orders.

[154] Captain [redacted] MBI Hearing Transcript, Pg. 1913

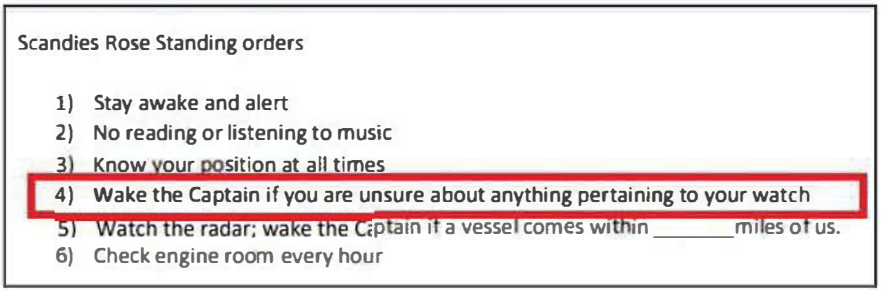


Figure 74 – This example was provided to the MBI as evidence of a typical SCANDIES ROSE Standing Orders from a previous voyage with date unknown (Source CG Exhibit 019, with Coast Guard mark up).

In the absence of clear standing orders, written or verbal, the crew did not wake the Captain as the conditions continued to worsen prior to the Captain's last watch. Any verbal orders similar to the contents of the example of standing orders contained in figure 74, above, need to be clearly communicated to all of the vessel crew and the intent understood. A verbal set of crew instructions for the navigation watch or standing orders don't appear to have been discussed when the crew met prior to departure. On standing watch, Mr. [redacted] testified

> *Q. Any -- yeah, any -- like were there particular times or expectations for making rounds or, you know, at what point to notify the captain?*
> *A. I mean, yeah, if you're listing hard over or something, clearly you're going to, you know, wake the captain up. Or if you're accumulating a lot of ice, you know, what should we do about -- it's looking like it's getting a little bad or, you know, if the weather -- for me, personally, like I -- a lot of guys will wake the captain up. I don't much, like let the guy get his sleep. So a lot of times, guys will wake the captain up if the weather just starts coming from a different direction and you just got a shitty course and you want to turn into it a little bit to have it ride a little nicer*[155]

Testimony from the survivors did not indicate that any member of the crew woke the Captain in their final watch periods late in the afternoon and in the early evening of the accident day, despite a steadily worsening situation on the SCANDIES ROSE. During these watches, there was increasing ice accumulation on the pot stack and the forward starboard side of the vessel and a list was developing on the vessel. Mr. [redacted] the last watchstander before the Captain took over for the final watch, in testimony stated

> *I think* [redacted] *got me around -- it was like 1730. And then I started watching it. And during my watch, the weather started coming up a little bit more, but it was already kind of crappy, but it started coming up a lot more. The wind started coming a lot more. And the waves started kind of coming quarterly. At first they were right off the bow, then they kind of started coming quarterly. So we were -- when we were taking spray, and we're taking good -- pretty good spray, and it was just spraying the starboard side really because that's where the waves were coming. And they got about halfway back for -- the pots were starting to ice over.*[156]

[155] Mr. [redacted] MBI Hearing Transcript, Pg. 560
[156] Mr. [redacted] MBI Hearing Transcript, Pg. 1061

It is unknown if the Captain was awakened or called for his guidance or directions at any time during the voyage by any of the other crew members.

5.1.4.3. Voyage Track

The vessel departed Kodiak on the Captain's watch and went up through Whale Pass into Shelikof Strait and then took a southwest heading. This was the opposite track the vessel took when it returned to Kodiak on the previous voyage. After turning towards the southwest there is little deviation from this track based on the AIS information available up until approximately 9:45 p.m. on the accident night. There is also no deviation on the general speed on that same course line. The track was a more or less direct route to False Pass and then to the fishing grounds. With the prevailing winds and forecast, the Captain could have travelled a slightly longer distance but move more northerly and closer to the Alaska Peninsula's southern coast in case he needed to seek shelter after he passed the available shelters on Kodiak Island's north shore. The track shows he was committed to his goal of reaching the fishing grounds with his late departure.

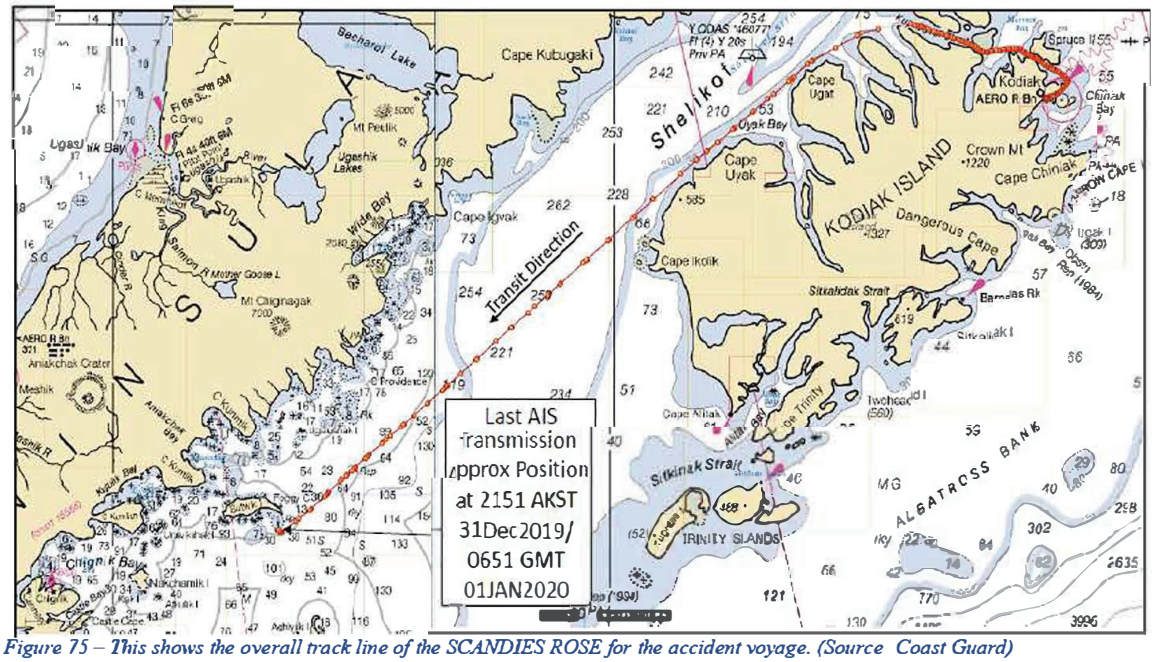


Figure 75 – This shows the overall track line of the SCANDIES ROSE for the accident voyage. (Source Coast Guard)

5.1.4.4. The Critical Turn to the Shelter of Sutwik Island

The turn to Sutwik Island was not part of the voyage plan and there is no way to determine if the Captain had planned for this type of emergency before departing Kodiak. One aspect of effective voyage planning is identifying risks and reducing risks through careful planning. Before undertaking the voyage, a captain would examine the available places of refuge along the route in the event of emergency or if he anticipated severe weather. Identifying these potential places of refuge would include the correct approach courses to minimize the dangers posed by hazards such as underwater rocks, reefs, submerged pipelines, and other dangers. As a consequence of this lack of planning, the

Captain of the SCANDIES ROSE was uncertain of the dangers posed by anchoring in the lee of Sutwik Island and he sought guidance from other captains.

When the Captain changed course to the starboard to seek the shelter of Sutwik Island, the time was approximately 9:45 p.m. and the SCANDIES ROSE was less than 5 NMs from the leeward side of the island which would afford shelter from the wind and seas that they were experiencing. As the vessel came into the lee of Foggy Cape—the eastern end of the island—and made the turn to starboard, the force of the supporting[157] winds and sea on the vessel that was listing to starboard were lost. Once that occurred, the vessel's list would have worsened and likely contributed to the vessel capsizing.

Shortly after the turn, the two survivors were jolted in their cabin by a sudden list harder to starboard than they experienced earlier. They immediately knew that the situation had become critical and Mr. [redacted] who ran to the wheelhouse, in testimony related

> *But then all the sudden, I rolled into my bunk, and just this sheer terror comes over me. Just I knew something was wrong. So I, I ran upstairs and I look at* [redacted] *and said what, what the (expletive)'s going on? What's going on? And he goes, I don't know what's going on. I said, I think we're (expletive) sinking. No (expletive) (expletive) we're sinking. Then I, then I look out the, the windows; they're iced over a little bit, but not a lot. And I'm just trying to figure out, how did it go from nothing to like the boat's literally like leaving us now.*[158]

5.2. Weather Forecasting and Actual Conditions Encountered

5.2.1. National Weather Service Forecast

As the SCANDIES ROSE got underway from Kodiak, the forecast presented the crew with a number of hazardous conditions for their upcoming voyage. The forecast would include gale force winds and associated seas as well as freezing spray and the danger of icing of the vessel. The NWS's OPC was issuing high seas weather charts depicting winds expected to be upwards of 45 to 50 kts between False Pass and Kodiak Island, AK. This area in figure 76, below, is a very strong low pressure system, but not uncommon in Alaska. With the center of the low pressure system just to the East of the area, this would make for NW winds and heavy icing potential.

[157] Supporting in terms of counteracting the increased listing of the vessel from icing or an unknown source.
[158] Mr. [redacted] MBI Hearing Transcript, Pg. 563

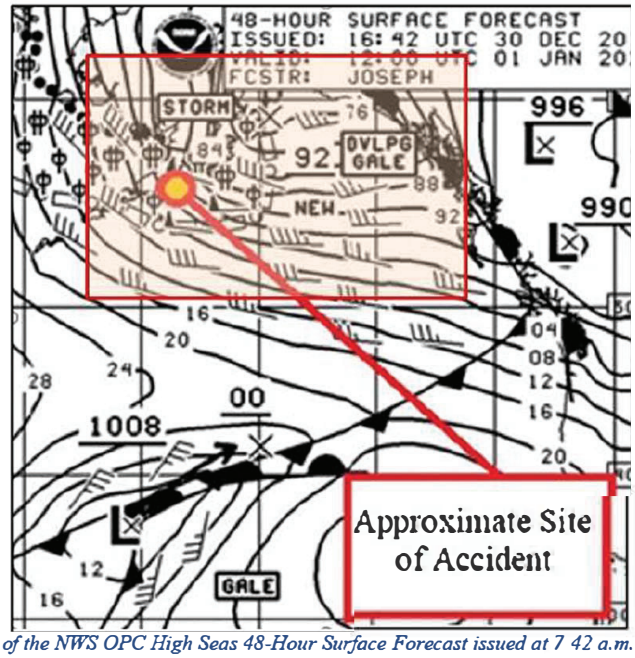


Figure 76 – Enlarged portion of the NWS OPC High Seas 48-Hour Surface Forecast issued at 7 42 a.m. AKST, December 30, 2019 thru 3 00 a.m. AKST, January 1, 2020. The approximate location of the storm is located in an area where the isobars are located close to one another and relatively close to the word "storm." As indicated by the shaded area in the red box. (Source CG Exhibit 028)

This was a winter weather forecast which mariners operating in Alaska were familiar with, as indicated in multiple Marine Board interviews. Discussions that Captain [redacted] had with others and his crew prior to getting underway acknowledged the dangerous forecasted weather but did not indicate that the Captain had a plan in place to reduce the risks associated with the weather.

The NWS and OPC provide full forecasts. They take current observations and the outputs from multiple weather prediction models and then a forecaster thinks critically about all of the information and provides a consolidated forecast. Weather forecasting is dependent on a number of possible data sources, including but not limited to satellite remote observations, ground radar, weather stations, and marine based observations. Marine based observations primarily include a limited network of marine weather forecasting buoys, pier weather stations, and a limited number of synoptic weather reports from ships. These vessels would be participating in NOAA's Voluntary Observing Ship Program, where ships would monitor the weather and provide reports that are considered vital to the NWS. The reliance on the experience and expertise of the forecaster is why the NWS's and OPC's graphical forecasts have a person's name on them, like the OPC forecast in figure 76, above.

The reason this is important is because each weather prediction model is different. The models utilize the same basic atmospheric equations, but they are set up differently. Some are global models, some are regional models, some are optimized for certain scenarios or locations, and they all make different assumptions and have different boundary conditions. Therefore, each model will give different outputs which are also not run continuously. A few times a day, the models have to be initiated and one model "run" is good for a certain number of hours in the future, but no model is good more than a few days out into the future as there is too much uncertainty that develops. Every six to twelve hours, the model is repeated again, and a whole new run is completed, which may or may not look anything like the output from

the run before it. The output that the mariner ultimately sees depends on the initial conditions used and the complexity of the weather.

As an example, if in one scenario there are five weather prediction models and they all agree, then statistically, the forecast has a higher probability of being accurate. However, if there are five weather models and they all disagree, then statistically, the chance of predicting the weather accurately is much lower. In these latter scenarios, the forecaster will look at how the models are trending over time (meaning, the different runs) and see which ones are the outliers and it takes training and a really good understanding of the physics of weather to sort this all out. In places like Alaska where the dynamics are so unique and quite variable, this can be difficult without even adding in the maritime component. In Alaska, there are less coastal and maritime weather observations because of the enormity of the area, so most models perform worse out at sea where this accident took place.

The weather station buoys covering the accident area were very limited. There was one buoy in Shelikof Strait and another buoy, Albatross Bank – 104 NM south of Kodiak Island, AK. At the approximate time of the incident, the Shelikof Strait buoy reported a sustained wind of approximately 32 kts and gusts of about 40 kts. The buoy offshore, Albatross Bank, measured sustained winds of approximately 26 kts and gusts of about 36 kts, with a wave height of 14.7 feet. Interviews with captain of the PACIFIC SOUNDER indicate that Captain [redacted] had told him he was experiencing winds of 60 to 70 kts just before the sinking. The captain of the WESTERN MARINER also testified to the winds in this area, and how they come off the mountains and deep glacial valleys and cause intense and violent marine weather. If the accident evening winds were even approaching 60 kts, it presents compelling evidence that there is a need for additional weather stations in the form of shore or sea based stations to build on the existing weather reporting stations in the remote areas of Alaska.

5.2.2. Actual Weather Encountered and the Rescue Operations

The weather the SCANDIES ROSE encountered on the accident voyage exceeded the forecasted conditions in many ways, including the wind speeds reported by the Captain shortly before the vessel sank.

As the SCANDIES ROSE proceeded on course for False Pass, AK on December 31, 2019, the weather continued to deteriorate. Sutwik Island lies just south of a particular region of the Alaska Peninsula known by fishermen for particularly challenging meteorological conditions. Captain [redacted] testified that the glaciers on the Alaska Peninsula funneled heavy, freezing cold winds coming down the mountains in the area leading to Sutwik Island on what would be the SCANDIES ROSE's course. These conditions could frequently exceed the forecasted conditions and many mariners knew about these dangerous local conditions.

During the rescue evolution, the pilot made a decision to keep the swimmer "on the hook"[159] for his safety as the wind and sea conditions were so severe. The swimmer was only in the water for a few minutes on the first hoist, but the conditions were so cold that the air crew

[159] "On the hook" refers to a tactic where the rescue swimmer remains made fast to the helicopter's hoist cable, which was used because the weather was so dangerous and there was a possible risk of not being able to retrieve the swimmer safely if he was released from the hoist cable.

had to knock ice off the swimmer, including his goggles and snorkel, between the first and second hoist. By this point, the recorded temperature in Shelikof Strait had dropped below 10° Fahrenheit. The hoist operator (the flight mechanic) started to have issues with feeling in his fingers and the lead pilot had to take control of the hoisting system with the controls he had available as one of the pilots.

After the vessel sank, weather continued to play a key factor. There was significant wind, overcast conditions and driving snow contributing to limited visibility for the crew. The pilot of the helicopter who rescued the two survivors testified that this was the worst weather he had flown in while working up in Alaska.

5.2.3. Experimental OPC Freezing Spray Website

The OPC offers a free, internet based freezing spray predictor for mariners. This website is experimental in nature, offering two projected icing models from well-respected researchers on ice accretion. Since these models are purely experimental, the NWS has no archived models for the accident timeframe. The models could not be reconstructed from the stored weather information for the accident period. The survivors both testified that the last ice they saw before they went to bed was manageable and the last man on navigation watch before being relieved by Captain [redacted] testified

> *A.…When I took over from [redacted] the ice was -- it was just the first couple layers, like a inch or two maybe thick, and going about halfway back on the stack. On the starboard side.*
> *Q. Right. And –*
> *A. Everything else was in a glaze but not thick.*
> *Q. And how far over the top of the stack? I'm trying to get a mental image of what portion of the stack had ice glazed on it when you took over from [redacted]*
> *A. Just the bars on the pots on the starboard side, and a little-- and the web -- you could see through the web just a little bit. Like, you know what I mean?*
> *Q. I do. Thank you. And so the pots that were in the middle of the stack and the pots that were on the port side were not iced at the time you took over from [redacted]*
> *A. They weren't. They had a glaze on them, but not -- it wasn't thick because they weren't hitting the spray that the starboard side was*.[160]

Subsequent analysis performed by the NTSB's investigation showed ice accumulation leading up to the accident time was extreme. Their estimates of ice accumulation was up to 1.6 inches per hour and a cumulative accumulation of ice between 6 and 15 inches in the final stages of the accident voyage. As previously mentioned in 5.1.1 of this report, several fishing vessel captains were interviewed during the hearings and none of them were aware of the experimental freezing spray webpage at the time of the accident.

[160] Mr. [redacted] MBI Hearing Transcript, Pg. 1152

5.3. Regulatory Framework and Policies

5.3.1. Alternate Safety Compliance Program

With the 2010 CGAA and the 2012 CGMTA, Congress mandated that the Coast Guard work with the commercial fishing industry to develop an Alternate Safety Compliance Program (ASCP) for "older" commercial fishing industry vessels such as the SCANDIES ROSE. The 2015 CGAA, published in February 2016, mandated that the Coast Guard analyze and report on the adequacy of regulations on fishing vessel safety by 2026. It further mandated the Coast Guard to develop an alternative safety compliance program if the Coast Guard determined the safety regulations to be inadequate.

The ASCP was scoped to apply to all commercial fishing vessels 50 feet or greater in overall length, that operated beyond three nautical miles from the baseline, were built prior to July 1, 2013, and were 25 years of age or older at the implementation of the program.[161] These older vessels were built prior to modern construction standards and, based on their age and condition, this increases the risks for the crews and the vessels. The objective of the ASCP was to require more stringent Coast Guard oversight, inspections, and training requirements for operators as a means to reduce the latent unsafe conditions on these older, higher risk vessels.

On December 1, 2014, the Coast Guard issued Marine Safety Information Bulletin (MSIB) 18-22 to remind the commercial fishing industry about safety and equipment requirements contained in the previous Coast Guard Authorization Acts, and that the once-voluntary Coast Guard dockside safety examinations would become mandatory starting in October 2015. The MSIB also highlighted a reminder of the impending creation and eventual implementation of the ASCP that had previously been announced to the public and the fishing community.

However, the ASCP, as mandated in the Acts, would require additional rulemaking in order to apply new safety requirements for older vessels and there was no time available between the announcement in the MSIB and the delivery date for the ASCP program to fully develop the program.

> *And so, in 2016, the Alternate Safety Compliance Program requirement acknowledged that older vessels required additional safety measures beyond those found in Part 28…The Coast Guard recognized that further development of an Alternate Safety Compliance Program was premature due to lack of alternative standards in the first place. And so that was the dilemma, the lack of standards to compare the Alternate Compliance Standard to.*[162]

As a result, on July 20, 2016, the Coast Guard issued MSIB 11-16, indicating that they were suspending development of the ASCP and would rely on existing regulatory and enforcement measures. The bulletin stated that the Coast Guard would instead work with CFSAC[163] and industry to develop an Enhanced Oversight Program (EOP) for commercial fishing vessels

[161] Mr. [redacted] MBI Hearing Transcript, Pg. 1212
[162] Mr. [redacted] MBI Hearing Transcript, Pg. 1212, 1213
[163] CFSAC was the name of the fishing safety Federal Advisory Committee at the time.

by January 1, 2017. The EOP would use existing Coast Guard authorities to attempt to provide greater safety initiatives for older commercial fishing vessels. In addition, the Coast Guard stated it would publish additional Voluntary Safety Guidelines for older fishing vessels. The EOP later evolved into the "Voluntary Safety Initiatives and Good Marine Practices for Commercial Fishing Industry Vessels."[164]

Also contained in the 2010 CGAA and 2012 CGMTA was an amendment to 46 USC §5103 (Loadlines) provision. The amendment mandated that the Coast Guard develop an Alternate Loadline Compliance Program (ALCP) in cooperation with the commercial fishing industry for vessels built before July 1, 2013 or those vessels that undergo major conversions. The program's intent is to address hull structural strength, watertight and weathertight openings and penetrations, stability, and sufficient freeboard for applicable vessels. At present, the Coast Guard has not started the development of this program.

These two alternate safety programs were modeled after the Alternate Compliance Safety Agreement (ACSA) program established in 2006. ACSA was produced and enacted for the BSAI and Gulf of Alaska freezer longliner and freezer trawler vessel fleet (head and gut fleet), following the losses of the F/V ARCTIC ROSE in April 2001 and F/V GALAXY in October 2002. Based on those investigations, it was discovered that approximately 60 commercial fishing vessels were going beyond minimal processing operations and should have met classing and loadline standards for fish processing vessels. Through cooperation with the commercial fishing industry, the Coast Guard developed a robust hull, machinery, and propulsion inspection program along with additional safety equipment and training requirements. Through the ACSA agreement, enrolled vessels would be exempt from full classification and loadline requirements and be permitted to continue to process specific NMFS fish product codes. This program was applicable only to this class of commercial fishing vessels. The SCANDIES ROSE did not fall into this inspection program.

5.3.2. Training Requirements for Commercial Fishing Vessel Operators

The 2010 CGAA added a subsection in 46 USC §4502 that requires an individual in charge of a commercial fishing vessel that operates three NMs beyond the territorial sea baseline to pass a training program and hold a certificate issued under that program. The requirement for establishing the technical competency for people operating and navigating commercial fishing vessels like the SCANDIES ROSE on the nation's waterways has not been fulfilled.

The 2010 CGAA provision stated that 46 CFR Part 28 had to be amended to set forth a requirement discussing a training program that addresses topical areas including, but not limited to, seamanship, navigation, stability, firefighting, damage control, safety and survival, and emergency drills. These training competencies require an individual to demonstrate the ability to communicate in an emergency situation and understand information found in navigation publications, vessel stability, and the significance of maritime weather's impact on vessel operations. The proposed training program would also have to acknowledge and give credit to an individual seeking this certification for recent past

[164] Mr. [redacted] MBI Hearing Transcript, Pg. 1213

experience in fishing vessel operations. Lastly, the CFR amendment would have had to address "recency" of knowledge, requiring the fishermen to attend some form of refresher training every five years.

As of the accident date, the regulations, policies, and procedures to put this training requirement and resultant certification in place had not been established despite considerable individual efforts by the members of the fishing industry working on various subcommittees of the then CFSAC to create these training programs and certification standards. During the hearing, the representative for CG-CVC-3 was asked about training and requirements for documentation of mariner training for commercial fishing vessels.

> *Q. So the Authorization Act, would that be a statutory requirement?*
> *A. It would, yes.*
> *Q. And did it mandate some form of certification? I heard that you mentioned the gaps and we are filling the gaps. But that then --*
> *A. Yes, yes.*
> *Q. Okay. So did it mandate actually producing some kind of documentation for the mariner that they were competent to operate the fishing vessels?*
> *A. ... There is statutory language stemming from the 2010, '12 Auth Acts, and that was part of -- or is part of the reg project that we talked about that was -- is well detailed and that docket that was in the final rule in 2016 -- I'm scrolling back. But those initiatives were packaged in that Notice of Proposed Rulemaking project that we talked about a little bit earlier this morning. That has not come to fruition since the rule has not become final and it still is in abatement, as reflected on that unified agenda. But to add -- to respond to your question, yes, that – it addressed -- or it does address training. But until certain things make it to reg, there may be certain elements of that, that may not be self-implementing or self-enacting.*[165]

Enacting the provisions in the U.S. Code was embraced as tasking for the federally mandated CFSAC and significant work was conducted to meet the provisions in the 2010 CGAA. The CFSAC recognized the need to increase the safety of the commercial fishing industry in terms of essential areas directly relating to the safety of vessel operations including the critical element of vessel stability. Already established work products and recommendations would establish a training certificate that would be valid for five years after which some form of refresher training would be required to keep the certification current to stay abreast of changes in technology and practices.

A comparison between the fishing vessel crews and the NMFS "fishery observers" that could be working aboard the same vessels highlights a different approach to training requirements for the safety of personnel. These observers are not operating a vessel or engaged in fishing, but rather observing the fishing operations to ensure that fishing regulations are being adhered to. These observers are required to be trained and certified in a comprehensive list of

[165] Mr. [redacted] MBI Hearing Transcript, Pg. 1249

safety topics and at a minimum, active observers shall be required to attend a hands-on marine safety training course within three years of their initial marine safety training.[166]

The establishment of requirements for operator competency outlined in the 2010 CGAA may have closed the gaps that contributed to this casualty. As an example, in the hours prior to the accident as the vessel transited along its route, had the crew on watch in the wheelhouse recognized the significance of the severity of the weather in terms of ice accumulation on the vessel and then its inherent impact on the vessel's stability, they may not have minimized the risk of a "couple of degrees" starboard list and may have taken earlier action to alert the Captain. Earlier communication of risk may have meant earlier action to slow, change course to lessen the freezing spray, or to manually remove ice from the vessel to improve stability.

Pertaining to importance of safety familiarization for crew persons, the Marine Board determined that by current regulations, drill conductor training is required only for the person leading the drills or providing the instruction and that person is not required to be the master nor a member of the crew. A safety orientation is required to be given to each individual on board who has not participated in the previous drill nor received instructions. The orientation includes covering the emergency instructions and procedures required by 46 CFR 28.265. Additionally, monthly drills are required to be conducted on board the vessel as if there were an actual emergency and must include participation by all individuals on board, breaking out and using emergency equipment, testing of all alarm and detection systems, donning protective clothing, and donning immersion suits. The current regulations do not require the drill conductor to have any form of "recency" once he or she has gone through the drill conductor training, even though equipment and safety procedures may have changed over time. In the case of the SCANDIES ROSE, Captain [redacted] completed his drill conductor course in 2009 and there was no evidence that he had been to any refresher or supplemental training since then, as there was no regulatory requirement for him to do so.

5.3.3. Loadline Requirements for Vessels Engaged in Fish Tendering

The SCANDIES ROSE was a vessel that fished for cod and crab by pot and the vessel also worked in the capacity of a fish tender vessel during other times of the year. Loadline requirements for fishing vessels stem from 46 USC § 5102. Tendering is not actually engaging in fishing operations, but rather using the vessel to transfer the various catches between the other fishing vessels and the processing vessels or facilities. A "fish tender vessel" must be assigned a loadline unless it meets a wide range of exemptions, as shown in figure 77. Having a loadline would subject a particular vessel to a series of guidelines or regulations that would impact the vessel hull maintenance and watertight integrity. The SCANDIES ROSE was not required to comply with loadline regulations since it started tendering operations prior to 1983. The ALCP would not apply to the SCANDIES ROSE since it had not undergone a major conversion after July 1, 2013.

[166] NOAA's NMS Observer Safety Training Standards - https://media.fisheries.noaa.gov/dam-migration/observer_safety_training_standards_062020.pdf

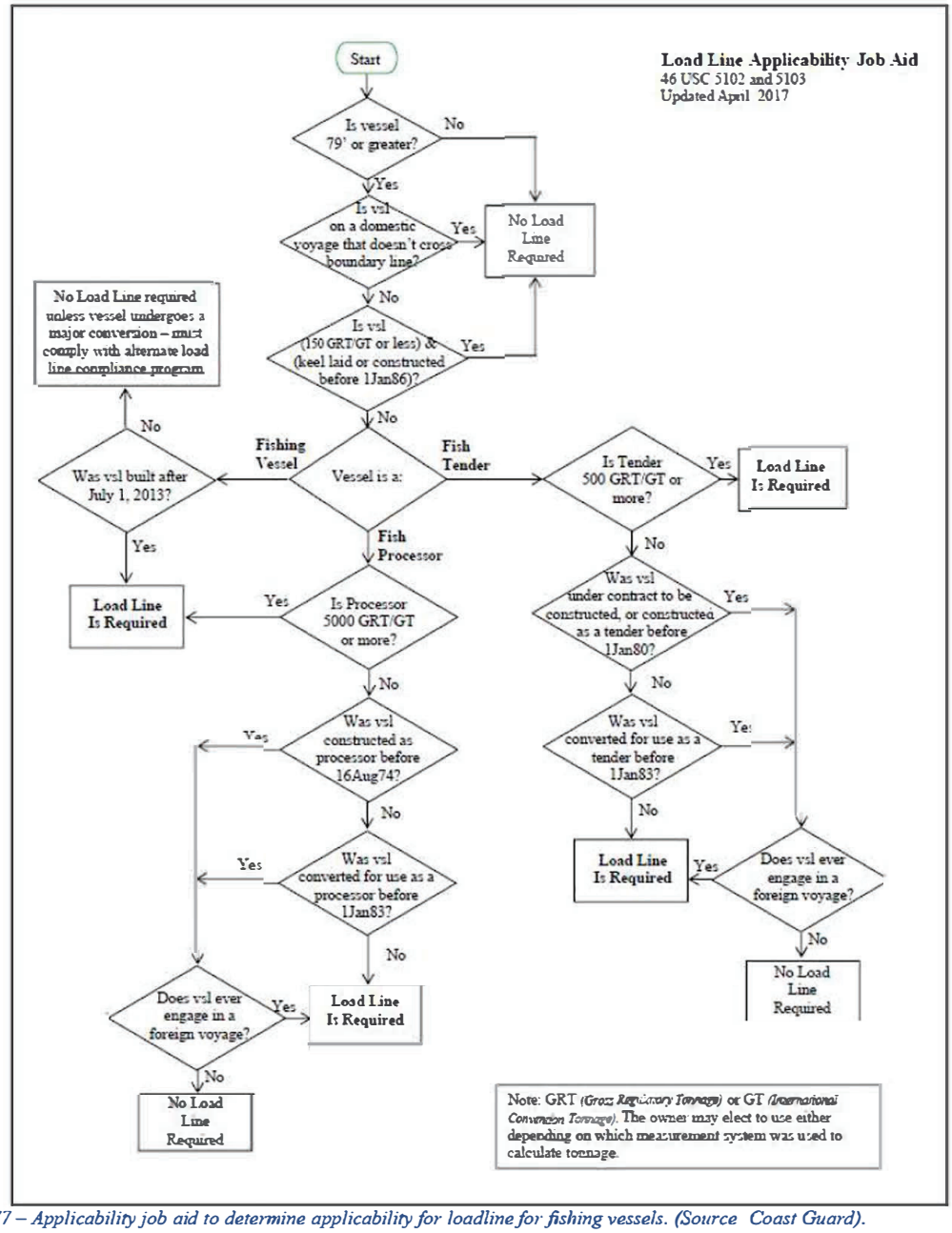


Figure 77 – Applicability job aid to determine applicability for loadline for fishing vessels. (Source Coast Guard).

Applying the loadline regulations is critical to fishing vessel safety because loadline standards are designed to address significant vessel characteristics such as a vessel's watertight envelope, strength and maintenance of the hull, watertight and weather tight closures, safe loading conditions, as well as measures of draft and trim. Had the SCANDIES ROSE been required to have a loadline or been enrolled in the ALCP, the requirements and oversight on the vessel would have been more stringent and may have resulted in measures that would have enhanced the survivability of the SCANDIES ROSE for the conditions encountered during the accident voyage. Since the SCANDIES ROSE was not required to have a loadline, and did not participate in a loadline program, the oversight of any structural watertight integrity issues was extremely limited at best. Repairs to the hull structure such as the closure of the starboard aft waste chute on the SCANDIES ROSE would have had a more

stringent level of oversight under this program in order to maintain their condition of loadline and most importantly the safety of the vessel.

5.3.4. Dockside Safety Examination Program

The Coast Guard and Coast Guard-accepted or similarly qualified third party organizations perform dockside safety exams on Commercial Fishing Industry Vessels. The purpose of these dockside exams is to attest to a vessel's compliance with federal safety standards related to lifesaving equipment, immersion suits, signaling devices, vessel stability, bilge pumps, bilge alarms, firefighting equipment, first aid equipment and ground tackle sufficient for the vessel. The dockside exam's scope also includes requirements for emergency drills, instruction and safety orientation of all people on board. As mentioned above, the 2010 CGAA added specific training requirements for the individual in charge of a commercial fishing industry vessel that would directly focus on critical lifesaving and safety equipment; however, implementing regulations have not been developed by the Coast Guard.

Based on the circumstances of this accident, there is one critical area among several that is not covered in safety compliance oversight that might improve the chances of survival for persons in distress – the enabling of the DSC feature on the various types of marine radios. Because it is outside of the regulatory scope of the exam, most CFV examiners are not examining the proper configuration and functionality of the marine VHF radios to determine if the radios have the distress feature of the DSC system activated and available for use in a distress situation. A properly configured DSC VHF radio with a knowledgeable operator is an efficient and effective tool to communicate distress. Most commercial vessels are required to have DSC VHF radios and many recreational users voluntarily utilize marine VHF radios with the DSC feature properly configured for immediate use.

The most recent dockside exam that took place prior to the accident voyage was in October 2018, during which they received a safety decal. In October 2019, Coast Guard personnel once again attended the vessel for a Safety Compliance Check. During that compliance check, the examiner utilized a checklist and verified and attested to the vessel's compliance at that date. The 2019 Safety Compliance Check confirmed the SCANDIES ROSE continued to be in compliance as of October 2019.

In the case of the SCANDIES ROSE, two personnel were able to successfully don immersion suits, board a liferaft that successfully deployed by means of hydrostatic release, and survive. Ensuring the proper float free arrangement of liferafts and serviceability of all lifesaving equipment are all items well within the scope of the dockside safety exam program and that program has impacted the safety culture of the commercial fishing industry. If other systems of the vessel were incorporated into the oversight of the current dockside safety examination program, to include structural repairs, it will increase safety for of one of the deadliest professions in the nation.

5.3.5. Safety Compliance Check Program for BSAI Crab Fleet

In 1999, Marine Safety Office Anchorage[167] initiated voluntary dockside Safety Compliance Checks to assist in reducing fatalities and vessel loss within the BSAI crab fleet. In particular, the goal of the Safety Compliance Check was to deter vessels from overloading crab pots. These Safety Compliance Checks were traditionally completed in early October of each year, before the crab seasons open and this practice continues today. During the examinations, Coast Guard CFV examiners verify and document that the vessel has the required safety equipment and stability instructions. Prior to 1999, the Coast Guard did not conduct these pre-season stability checks or weigh the crab pots. Examiners began measuring and weighing pots after a 2017 marine accident involving the DESTINATION that occurred in the Bering Sea off of St. Paul Island, AK. The CFV examiner cross-references the pot weight and measurement information and the current loaded condition of the vessel with the vessel's stability instructions and will discuss the results with the vessel's captain.

Safety Compliance Checks, as envisioned and initially executed, involved collaborative dockside vessel visits using Coast Guard CFV examiners and ADF&G personnel. While ADF&G personnel conducted crab fisheries tank and pot checks, the Coast Guard would work with the vessel's captain to examine suitability of lifesaving equipment and compliance with the vessel's stability instructions to check for overloading. If the Coast Guard found vessels overloaded or without required stability instructions, they would issue the vessel a Captain of the Port (COTP) Order requiring the vessel to remain at the dock until the vessel corrected the safety deficiencies. Currently, the Coast Guard conducts Safety Compliance Checks independently from ADF&G personnel and only after a vessel volunteers to participate.

During Safety Compliance Checks, the CFV examiners document their exams on a Safety Compliance Check form that has been developed by Sector Anchorage. The form includes information such as pots allowed, pots loaded, stability instructions onboard and issue date, in addition to information on safety equipment. The form also includes a space to document noted deficiencies and when they are corrected.

Alaska state law[168] requires fishermen to contact the Coast Guard at least 24 hours in advance of leaving port if they are fishing for crab. There is no equivalent requirement or law for operators of vessels fishing for cod with pots which present the same level of risk. As the SCANDIES ROSE left on the accident voyage to go fishing for cod, there was no regulatory requirement for Captain [redacted] to notify the Coast Guard that the vessel was heading out to sea.

Coast Guard CFV examiners conducted Safety Compliance Checks on the SCANDIES ROSE from 2004 through 2019 and documented the Safety Compliance Check activity within the MISLE database. None of the vessel's historical Safety Compliance Checks noted violations or non-compliance with safety or stability requirements.

5.3.6. Credentialing and Licensing

[167] Marine Safety Office Anchorage is the predecessor of the Coast Guard's current unit, Sector Anchorage.
[168] Per 5 AAC 39.670, an operator of a vessel participating in an IFQ, CDQ, or Adak community allocation crab fishery in the BSAI area. Opilio crab fall under the applicability of this administrative code.

The commercial fishing industry operates thousands of vessels on the waterways of the United States as well as offshore waters. These vessels operate on the nation's critical waterways alongside tankers carrying hazardous cargoes, high capacity cruise ships, towing vessels, and in close proximity to critical infrastructure such as bridges, locks, and other infrastructure. The table below shows the requirement for some level of credential or certification to operate a vessel. The state requirement for Alaska is also included for recreational vessels as the accident occurred off the Coast of Alaska.

Requirements for Vessel Types as of January 2021

	Recreational Vessel	Uninspected Passenger Vessel	Small Inspected Passenger Vessel	Towing Vessel	Commercial Fishing Vessel Less Than 200 GRT	Commercial Fishing Vessel Greater Than 200 GRT
USCG Credential or License for Competency	No	✓	✓	✓	No	✓
Operator's License from State of ALASKA	N/A	N/A	N/A	N/A	N/A	N/A
Medical Examination for Medical Fitness	No	✓	✓	✓	N/A	✓
Drug and Alcohol Testing	No	✓	✓	✓	✓[1]	✓
Suitability Background Check	No	✓	✓	✓	N/A	✓
Minimum Age	N/A[2]	18	18	19/21[3]	16[4]	21

[1] Drug and alcohol testing is required post serious marine incident (SMI) only.
[2] Per the AK Office of Boating Safety, there are municipalities that have minimum ages, but the State of AK does not mandate a minimum age.
[3] 46 CFR 11.201(e) table outlining medical and physical requirements. To act as a deck hand the minimum age is 19. To get minimum licensing the minimum age is 21.
[4] Per AK state law, the minimum age is 16, unless the individual's parent is operating the vessel, then the minor can be employed on this CFV.

Figure 78 – Table showing the requirements for mariner to operate various vessel types under existing state and federal regulations as of the accident date up to and including January 2021. The column highlighted in yellow represents the regulatory standards applicable to vessels like the SCANDIES ROSE. (Source Coast Guard)

The maneuverability, navigation, seamanship, and safety concerns associated with commercial fishing vessels are the same as those for other vessels listed in the above table. Depending on the type and location of fishery, these concerns can be elevated on commercial fishing vessels given the extreme weather conditions and hazards associated with stability and ice. Yet, there is no requirement for licensing of personnel operating or forming part of the crew on commercial fishing vessels like the SCANDIES ROSE. Even a person operating an uninspected passenger vessel is required to hold a Coast Guard credential attesting to their competency to operate the vessel.

Other vessels in commercial service such as small passenger vessels, tugs, tankers, and container ships all require a certain level of minimum safe manning by mariners with Coast Guard issued credentials. A requirement to hold a Coast Guard issued MMC involves medical certifications and minimum age requirements. The credentialing process also requires a person to undergo a suitability assessment to determine if the individual has any issues that under federal law and regulations would prevent the issuing of a credential, for instance drug usage, drug convictions, or certain criminal activities. The goal of this program is to ensure that commercial mariners do not create a risk to the nation's waterways or natural

resources when they operate a commercial vessel. There is no similar requirement for commercial fishing vessels under 200 GTs.

5.3.7. Coast Guard Stability Guidance

5.3.7.1. A Best Practices Guide to Vessel Stability

In the absence of formal credentialing standards, the Coast Guard has made efforts to educate commercial fishing vessel operators on operational considerations for vessel stability. In 2005, the Coast Guard published *A Best Practices Guide to Vessel Stability* for commercial fishermen.[169] While this guide does not comprehensively provide the reader with a knowledge base commensurate of formal training, it does provide explanations on basic stability issues. One such condition is the unsafe accumulation of ice.

Several fishermen interviewed throughout this investigation talked about the feel for the fishing vessel's movement beneath their feet, referring to how they could feel when a vessel was reduced in its stability based on the roll or recovery time for the rolling fishing vessel moving in the sea. In reality, mariners may not identify the early phases of stability reduction when stability may be compromised. For instance, accumulating ice has the same effect on a fishing vessel as if it was overloaded with pots that had been stacked above the main deck (above the vessel's original center of gravity). The loss of stability from ice may be subtle because, similar to overloading a vessel, the initial stability at small angles of heel are only slightly reduced. In other words, the crew may not notice a difference as the vessel rolls at smaller angles and returns. However, initial stability does not accurately encompass the vessel's overall stability as the ice begins to load the vessel, as shown in the figure below.

In figure 79, below, it is important to note that the bottom left images show icing. The ice is applied in the image uniformly and the example still illustrates the danger of ice accumulation. As the vessel continues to gain weight above the waterline, the list gradually worsens and the ability for the vessel to right itself decreases, leading to the potential for sudden and catastrophic capsizing. This image, while representing the negative effects of icing, does not take into account the dangers associated with the increased dangers of asymmetrical icing[170] on a vessel.

[169] *USCG Stability Reference Guide,* https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/CG-5PC/CG-CVC/CVC3/references/Stability_Reference_Guide.pdf

[170] Asymmetrical ice accumulation is where more ice accumulates on one side of the vessel as opposed to an even distribution of ice and associated weight across both sides of the vessel.

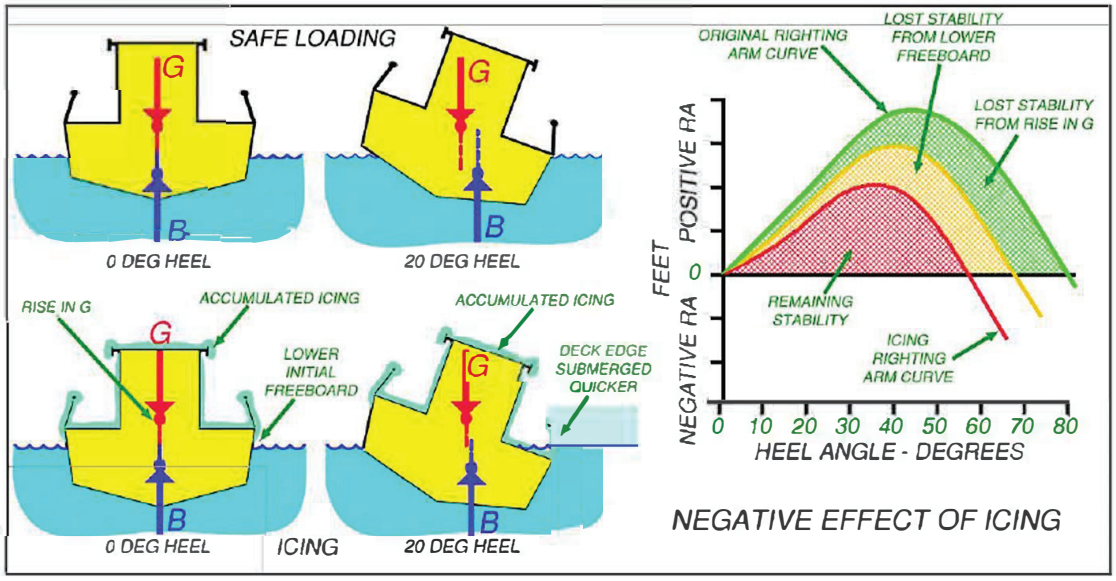


Figure 79 – An image taken from the Coast Guard's Stability Reference Guide showing the effects of icing on a vessel which can result in a loss of stability and the potential for capsizing. (Source USCG Stability Reference Guide, https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/CG-5PC/CG-CVC/CVC3/references/Stability_Reference_Guide.pdf)

When icing conditions are encountered, the *Best Practices Guide to Vessel Stability* recommends immediately taking the following corrective actions:

> *If possible, alter course to return to warmer or protected waters.*
>
> *Steaming downwind reduces the speed of ice formation but use caution if the seas are very strong because stern seas increase the chance of broaching, boarding seas, or burying the bow.*
>
> *Secure all fishing gear below deck to minimize surfaces that ice can from on.*
>
> *Keep freeing ports clear of ice to allow rapid draining of water off the decks.*
>
> *Remove as much ice accumulation as is safe for the current weather conditions.*
>
> *Maintain radio communication with other fishing vessels and shore side on a regular schedule.*
>
> *All lifesaving equipment should be broken out and ready for use.*[171]

In the case of the SCANDIES ROSE, there is no evidence that steps were taken to alter course to more protected waters, to steam down wind, or change course to minimize icing in the earlier stages of the voyage. In addition, there is no evidence that steps were taken to remove the ice that accumulated on the pot stack at any point in the voyage. This is because the Captain determined it was too rough for his crew to manually break ice in the

[171] *USCG Stability Reference Guide,* https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/CG-5PC/CG-CVC/CVC3/references/Stability_Reference_Guide.pdf, Pg. 49

current weather conditions and intended to wait until the vessel entered sheltered waters near the south side of Sutwik Island.

The Coast Guard's guidance pamphlet emphasizes that operating in icing conditions significantly reduces a fishing vessel's stability because the weight of the accumulating ice affects two crucial factors—the center of gravity and the freeboard.[172] First, the vessel's center of gravity rises rapidly from the weight of ice added high on the vessel. This is especially emphasized on vessels carrying high deck loads like crab pots. Second, the vessel's freeboard is reduced because, as ice accumulates, the additional weight of ice results in the vessel sitting lower in the water, increasing the likelihood that the deck edge may submerge at smaller heel angles. Icing also increases the surface area that wind may affect, where the wind force would exert its push. Increases in the projected surface area increase the wind heel of the vessel, which, coupled with decreased freeboard, significantly increases the probability of deck submergence. In the early phases of the SCANDIES ROSE's accident day, the force acting on the vessel caused by the wind was acting on the starboard side, the same side that the ice was building, but in doing so, it was counteracting the list caused by ice or any other source of listing.[173]

The accumulation of ice throughout the day of December 31, 2019 was considered relatively minimal by the survivors. When Captain [redacted] took the watch on or about 7:15 p.m., the survivor who was relieved referred to the vessel's icing several times as "a glaze" but also commented that it was an "inch or two maybe thick, and going about halfway back on the stack. On the starboard side."[174] Both survivors who had watch before the Captain's final watch considered this ice buildup as inconsequential. Analysis of the trackline data showed that the vessel did not take any significant course changes leading up to this point and the witness's testimony may verify that it would not have been deemed necessary up until this point. However, Mr. [redacted] testified that when he was relieved by the Captain, he asked the captain if he wanted him to have the guys go down and break ice off the bow[175] but he was told by the Captain that he was likely to pull into the lee of Sutwik Island to complete that task.

There was no other indication by witness testimony or trackline analysis that shows the Captain took measurable steps to mitigate any ice in accordance with the above guidance. It is also important to note that meteorological reports and testimony indicate the wind and weather was meeting the SCANDIES ROSE on its starboard side through most of the last 24 hours of its voyage. Captain [redacted] plan to turn north or starboard would be in direct conflict with the guidance to turn downwind to minimize ice accumulation. This is noted cautiously since the actual sea state and how the SCANDIES ROSE would dynamically interact with these seas if the Captain were to turn to port is unverifiable.

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[172] The *freeboard* is the vertical distance between the waterline and the highest watertight deck.
[173] The MSC provided a comprehensive model of the SCANDIES ROSE potential for asymmetrical ice accretion which can be viewed in the upper image of figure 110. Complete details can be found in CG Exhibit 138.
[174] Mr. [redacted] MBI Hearing Transcript, Pg. 1152
[175] Mr. [redacted] MBI Hearing Transcript, Pg. 1107

It is important to note that the SCANDIES ROSE had a deck heating system in the bow compartment. The deck heating system was a heater unit, believed to be a 60,000 watt heater, and its purpose was to reduce potential ice accumulation off the focsle deck.[176] Testimony was provided that prior to departure on the accident voyage, crewmembers activated the bow heater to melt snow off the deck and secured the forward compartment.[177] The capacity of the bow heater to reduce the total amount of ice accumulation on the bow is unknown.

The stability of the vessel was significantly compromised while the SCANDIES ROSE made its final turn towards Sutwik Island. The testimony indicated that when Mr. [redacted] was woken up, there was a significant heel to the vessel. Mr. [redacted] and Mr. [redacted] both testified that they did not hear any alarms going off on the bridge when they initially reached the wheelhouse and for the majority of the time they were in up on the bridge. At this point, the testimony suggests that the vessel was heeling approximately 20 degrees to starboard. The MSC Report indicated that submergence of the deck could happen at angle of heel as small as 30 degrees. The vessel's turn toward the island changed the wind's relative impact on the vessel. As a result, the wind which had been, in effect, propping the vessel up when the vessel was travelling in a southwesterly direction was now acting on the vessel's port side. The effect was a dramatic increase in the vessel's list. The observed, approximated heel of the vessel was very close to this point. Mr. [redacted] stated in testimony

> *At that time, I saw [redacted] coming out of the engine room again, and so I figured he was down there transferring fuel to fix the list. And then I ate my sandwich. I went back to bed, and started watching a movie. About a [sic] hour and a half maybe, about 9:30 or so, felt the boat go hard to starboard. My first instinct was we were going to turn around and start running with it to go break off bad sea, give us a little safer ride to go beat the ice off. That was my first instinct. Now, I was on the top bunk, so I told [redacted] to go see what's going on and -- because it's easier for him to get up. And he ran upstairs and yells down, [redacted] the boat is sinking. What? I jump up, and I try and get my pants on, and I -- try and get my socks on. I feel the boat rolling a little more. I'm like, oh, no.*[178]

5.3.7.2 Voluntary Safety Initiatives and Good Marine Practices for Commercial Fishing Industry Vessels

The Coast Guard updated engagement in overall fishing vessel safety in 2017 by releasing Voluntary Safety Initiatives and Good Marine Practices for Commercial Fishing Industry Vessels.[179]

The CFSAC met and published a response to the ASCP program and how it should apply to older vessels. The intention of this document was to provide minimum safe standards on commercial fishing vessels for various systems including but not limited to lifesaving,

[176] Mr. [redacted] MBI Hearing Testimony, Pg. 81
[177] Mr. [redacted] MBI Hearing Testimony, Pg. 556
[178] Mr. [redacted] MBI Hearing Transcript, Pg. 1067
[179] CG Exhibit 047

fire prevention, electrical, mechanical, flooding, and stability. As an example, the guidance discussed watertight and weathertight integrity standards for commercial fishing vessels, stating that every vessel should maintain an "at-sea policy for maintaining and verifying weathertight/watertight integrity and the status of such closures."[180]

Despite the fact that the guidance was spearheaded by a group comprised of people representing the commercial fishing industry, it was unclear how much of this Voluntary Safety Initiative guidance was available and reached one of its intended targets, the crew and management of the SCANDIES ROSE. The two newest crewmembers could not account for any instructions or guidance provided by the Captain or other crew of the SCANDIES ROSE regarding maintaining watertight and weathertight integrity. Review of photos of the SCANDIES ROSE and interviews with the surviving and former crewmembers also indicated that the watertight door in the engine room was normally left open. Loose discipline on maintaining watertight and weathertight integrity while underway by keeping doors or openings unsecured would have left the vessel vulnerable to progressive flooding had there been an unknown and unaddressed source of water ingress.

5.3.7.3. Marine Safety Alert 11-17

Following the sinking of the DESTINATION, the Coast Guard released further guidance to the vulnerable fishing vessel fleet in Marine Safety Alert 11-17.[181] The Marine Safety Alert drew attention to stability concerns on fishing vessels. The document was a two-page document which brought attention to several key factors which impacted stability. It addressed concerns of vessel weight creep, the importance of maintaining watertight integrity, recommending operators weigh a sampling of their pots annually, and familiarize themselves with their stability instructions. The Marine Safety Alert really emphasized the importance of avoiding sailing through areas with freezing spray forecasted and to reduce topside gear when unavoidable. It also stressed the need for fishing vessels to renew their stability instructions periodically, recommending validation at least every five years.

This Marine Safety Alert provides concise guidance to fishing vessel operators to operate vessels safely. Unfortunately, none of the fishing captains interviewed during the MBI Hearing recognized or had previously seen the Marine Safety Alert. The mechanism for release and distribution of these documents may not readily reach the remote fishing communities in Alaska. Regardless, it was noted that the sinking of DESTINATION served as a reminder to some fishing vessel operators of the dangers inherent in this occupation, and many operators took proactive steps to re-evaluate their vessels' stability. The SCANDIES ROSE Fishing Company LLC was one of these operators and new stability instructions were prepared in 2019, only months before the vessel sank.

[180] U.S. Coast Guard's Office of Commercial Vessel Compliance, Voluntary Safety Initiatives and Good Marine Practices for Commercial Fishing Industry Vessels, January 2017, Pg. 9
[181] CG Exhibit 046

Despite the fact that the guidance was disseminated by the Coast Guard through multiple channels, it was unclear how effective communication efforts were for these Marine Safety Alerts. In testimony, the Marine Board asked multiple captains whether they were familiar with this particular Safety Alert and none of them were aware of the document, its contents, or the available platforms on which the Coast Guard posts this and other essential safety notices.

5.3.8. Third Party Stability Training

Captains and crew of commercial fishing vessels such as the SCANDIES ROSE are not required to participate in formal stability training. The NPFVOA based in Seattle, WA, and AMSEA based in Sitka, AK, both offer Coast Guard accepted stability courses that tailor training to fishermen. The executive directors for both organizations testified that because these courses are not required by regulation or by industry standard, participation has been traditionally low. In addition to these two training institutions, other entities such as Fish Safe BC, located in Richmond, British Columbia, Canada, have also produced valuable information on stability for mariners. This organization produced a training video tailored for fishing vessel operators which can be used as a tool to train fishermen on stability and fishing.[182]

HYPERLINK: Enclosure (2) contains hyperlink (3) which is a video prepared to assist fishermen in dealing with stability related risks on fishing vessels.

One fisherman who was required to take a stability class to obtain a MMC testified that while learning about icing in class, he was surprised by the negative stability impact of even a small amount of ice accumulation. The same mariner suspected that other fishermen and vessel captains would come to the same realization and would benefit from the training.[183]

Following the sinking of the SCANDIES ROSE, Crawford Nautical School, also located in Seattle, WA, partnered with Mr. [redacted] the minority owner of SCANDIES ROSE, to develop a stability class specific to BSAI crab vessels. As of March 2020, the 8-hour class had been offered twice and was well attended according to the instructor. Two participating crab vessel captains testified that they would highly recommend the class, and one mentioned that he believed the class should be mandatory for all crab vessel captains. [184] In testimony, the Marine Board heard that during one of the stability courses, amongst even the very experienced captains in attendance, there was a varied range of answers regarding their understanding on what "heavy icing conditions" meant.[185] This gives the Marine Board concern regarding fishermen's perceived margins of safety when it comes to stability and real-life icing conditions.

Stability instructions prepared by a naval architect can be a very complex document for anyone to read. In the basic form, it seems very simple; it outlines approved loading configurations for the vessel based on the operator's input. The fisherman tells the naval

[182] CG Exhibit 127
[183] Mr. [redacted] MBI Hearing Transcript, Pg. 672
[184] Captain [redacted] MBI Hearing Transcript, Pg. 166
[185] Mr. [redacted] MBI Hearing Testimony, Pg. 184

architect how they load their fuel and liquid tanks in different configurations, then the naval architect tells them how much gear can be carried and in what locations. These instructions are based on a static analysis, and typically only take into account the amount of icing required by the regulations. Additional ice, green water, and/or flooding water is not accounted for. At sea, when the vessel takes on an accumulated ice load or extra water on deck, it is difficult for the fishermen to understand how their vessel's stability may be changing and how rapidly it changes. Stability courses could help fishermen to better understand their stability instructions, the limitations of those calculations, and the adverse effects of the many different factors that can effect stability.

5.3.9. Significant Commercial Fishing Vessel Accident Analysis

During the course of the SCANDIES ROSE investigation, the Marine Board examined other historic major marine accidents involving commercial fishing vessels to determine if there was a common issue resulting in the loss of a vessel such as the SCANDIES ROSE. Since 2000, the Coast Guard has conducted 11 MBIs, the highest-level formal Coast Guard marine accident investigation. Of these 11 MBIs, six of them were devoted to the loss of commercial fishing vessels.

Figure 80 below lists notable fishing vessel casualties. With the exception of the F/V ALASKAN RANGER, a larger fish processing vessel which was part of the ACSA program, all of the vessels were uninspected commercial fishing vessels. All of the other commercial marine vessel types such as small passenger vessels, towing vessels, industrial vessels and others of the size and type of the SCANDIES ROSE of the U.S. are subject to some form of regulation or governmental oversight including a full marine inspection or examination regime.

Notable Fishing Vessel Casualties							
Name of Vessel	Date	Event	Result	Crew Size	Survivors	Deceased or Presumed Deceased	Missing
ARCTIC ROSE *	April 2, 2001	Flooding/Sinking	Loss of Vessel	15	0	15	14
ALASKAN RANGER *	March 23, 2008	Flooding/Capsize	Loss of Vessel	47	42	5	1
KATMAI *	October 22, 2008	Flooding/Capsize	Loss of Vessel	11	4	7	2
COSTA & CORVO	November 13, 2008	Sudden Capsize	Loss of Vessel	4	3	1	1
LADY MARY	March 24, 2009	Progressive Flooding	Loss of Vessel	7	1	6	4
NORTHWEST MARINER *	January 15, 1995	Capsize/Icing	Loss of Vessel	6	0	6	4
PACESETTER *	January 27, 1996	Presumed Capsize	Loss of Vessel	7	0	7	7
MISTY BLUE	December 4, 2017	Downflooding	Loss of Vessel	2	2	2	0
DESTINATION *	February 11, 2017	Capsize/Icing	Loss of Vessel	6	0	5	5
*** Occurred in Alaskan Waters**							

Figure 80 – The image above shows significant marine accidents involving commercial fishing vessels. These accidents were examined by the MBI during this investigation. (Source Coast Guard)

With the same exception, the ALASKAN RANGER, none of these vessels required plan review oversight and there was no requirement for the design and construction for any of the vessels. As the vessels aged over time, there was no prescribed inspection regime that would determine if there were issues with the material condition or the proper operation of critical equipment such as engines, hatches and openings, steering systems, bilge pump systems, wiring and electrical components.

Lack of oversight extended to the vessel personnel operating the vessel in terms of a verified competency to navigate the vessel on the congested waterways of the U.S., the medical fitness for personnel and in the case of the vast majority of vessel personnel, if those personnel were free from impairment from fatigue or from alcohol, drugs, or over-the-counter medications.

To that end, the only regulatory oversight these vessels receive is limited to an examination of the vessel's lifesaving and safety equipment and the requirement for drills and training prior to getting underway for the fishing voyage. In these cases, a Coast Guard or third party examiner would conduct a Dockside Safety Exam to determine if the vessel's lifesaving and safety equipment complied with existing regulations.

In the case of some of these accidents, it is difficult to rule out a series of potential contributing factors that may have contributed to the sinking and loss of life. In the case of

the SCANDIES ROSE, the "doubler" repairs in earlier 2019 to the after starboard overboard chute cannot be ruled out as a potential point of hull failure. Certain areas of the hull could not be visualized during the underwater ROV evolutions due to the vessel lying on the bottom on its starboard side. Due to the size, type and class of the SCANDIES ROSE, there was no requirement for the SCANDIES ROSE owners to report the hull wastage issues with the starboard overboard chutes to the Coast Guard or to a Third Party. Neither was there a requirement for certified welding techniques and non-destructive testing after the repairs were made to ensure the sufficiency of the quality of those repairs which were made to the hull in or near the vessel's waterline. The same can be said for all of the commercial fishing vessels listed in the table of major marine accidents.

Compared to other commercially operated vessels, the limited regulations, licensing, and oversight of the commercial fishing industry results in latent unsafe conditions resulting in risks to the crews of these fishing vessels which is especially magnified for vessels operating in the harshest of marine environments. This risk extends to the Coast Guard and other agency partners who then have to search for, tow, rescue, and respond to fishing vessel accidents.

During the hearing, the representative for the Coast Guard's Office of Commercial Vessel Compliance (CG-CVC-3) was asked why the Coast Guard does not inspect commercial fishing vessels. That representative stated that

> *We act solely on our statutory authority, and that does not permit us to raise the level of inspections to that of other industry vessels. So I think my answer to that is we just have to interpret the statutory authorities that are given us to enforce. And that influences, you know, the requirements and applicabilities that we impose during our dockside exams.*[186]

However, the same representative gave testimony about regulatory progress the Coast Guard has made considering the Coast Guard Authorization Acts enacted over the ensuing years, in other words, a statutory requirement that called for regulated change for commercial fishing operations. The Coast Guard has had the Authorization Acts as a catalyst to create regulations but did not manage to enact regulatory requirements for a variety of reasons, including the push to deregulate in the years 2016 through 2020. During the MBI Hearing, the head of CG-CVC-3 was asked

> *Q. …it's been over ten years and there's been at least four to five individual Coast Guard Authorization Act statutes related to commercial fishing vessels. How many regulations have actually been developed and promulgated for commercial fishing vessels in that time?*
> *A. I will say, regulations as -- just to clarify, sir, regulations as reflected in 46 C.F.R.?*
> *Q. That's correct.*
> *A. And I would say in the past ten years, zero. And yeah, zero.*[187]

CG-CVC-3 has been engaged in some regulatory projects in the last decade. Completed

[186] Mr. [redacted] MBI Hearing transcript, Pg. 1244
[187] Mr. [redacted] MBI Hearing Transcript, Pg. 1231

rulemaking projects included Citizenship Waivers (Final Rule issued February 2014), Processors carrying and dispensing petroleum (Final Rule issued March 2016), and Requirements for vessels with registry endorsements (Final Rule issued September 2016). During the MBI Hearing, CG-CVC-3 was asked about a guiding framework to implement change for commercial fishing operations, a strategic plan. While CG-CVC-3 has a strategic plan, it did not include a provision to shift CFVs similar to the SCANDIES ROSE to an inspection regime similar to other commercial vessels.

> *Q. Does that plan include anything related to developing an inspection plan or campaign for these under 200-ton commercial fishing vessels that doesn't cover what's already in existence? For example, the material integrity of the hull. We've heard the Scandies Rose had some issues with the forward starboard chute that was cropped out due to porous welds. That type of inspection campaign, are there any plans for that?*
> *A. We did not, we did not have a line item to move uninspected fishing industry vessels to inspected fishing industry vessels. And going back to my previous comment, I think when we, when we review our statutory requirement guidelines, our current policies, our NAVICs, and trends, our live report of investigation results collectively, and we see patterns and indicators that may point us to consider going down certain roads of tighter regulation or just improving certain regulation that -- then we pursue those initiatives. But to have a blanket line item to transition from uninspected to inspected, no, we currently do not have that.*[188]

It appears that there is no deliberate push to mandate Coast Guard commercial fishing vessel inspections or even an industry voluntary fishing vessel inspection and maintenance regime that would enhance the safety of fishing operations. Thus, the fishing fleet will continue to age and face the risks associated with hull integrity and stability issues. At the same time, fishermen will still take to sea and attempt to manage the known and unknown risks associated with these older commercial fishing vessels which operate with latent unsafe conditions such as stability, hull integrity, steering and propulsion compromises that may result in tragedy.

5.3.10. United States Regulations for Commercial Fishing Vessel Stability

As the regulations are currently written, a commercial fishing vessel would be required to have its stability evaluated when the vessel is greater than 79 feet and the vessel is constructed after September 15, 1991, or when the vessel has been substantially altered after this date. The SCANDIES ROSE was greater than 79 feet but was constructed before September 15, 1991. Modifications were made to the vessel's superstructure after it experienced a fire in 1988 which may have resulted in substantial alternations to the vessel, though evidence indicates this work was completed before September 15, 1991.

There were additional modifications made to the forward part of the vessel around 1994/1995 with the addition of raising the focsle deck and the addition of a breakwater on the focsle deck. The regulations state that it is the owner's responsibility to ensure they select a qualified individual to conduct a stability test and that the owner needs to maintain the results

[188] Mr. [redacted] MBI Hearing Transcript, Pg. 1246

of that test. Per 46 CFR 28.510, a qualified individual would be "an individual […] with formal training in and experience in matters dealing with naval architecture calculations." In this case, Captain [redacted] testified that the Naval Architect hired to conduct the 2019 stability tests for the SCANDIES ROSE was a licensed Professional Engineer so he thought that he was certified and competent to conduct the required stability test and then to create the stability instruction for the vessel.

In general, after completing stability testing, a naval architect would provide a vessel with stability instructions, which typically are comprehensive documents provided to the owner with the results of the stability assessment and calculations which comprises important stability information for the vessel operator. This booklet fulfills the requirement for stability instructions. Per stability regulations, 46 CFR 28.530(d) and (e), these instructions should include up to 17 functional parts, such as:

- Simple loading instructions
- Simple loading diagram with instructions
- Stability book with sample calculations
- General description of the vessel, including lightweight data
- Instructions on the use of the information
- General arrangement plans showing watertight compartments, closures, vents, downflooding angles, and allowable weights
- Loading restrictions, such as diagrams, tables, descriptions or maximum KG[189] curves
- Sample loading conditions
- General precautions for preventing unintentional flooding
- Capacity plan or tank sounding tables showing tank and hold capacities, centers of gravity, and free surface effects
- A rapid and simple means for evaluating any specific loading conditions
- The amount and location of fixed ballast
- Any other necessary guidance for maintaining adequate stability under normal and emergency conditions

The above list is not exhaustive. There is a key statement in this regulation – the stability information content noted above "should" be provided to the owner and operator yet all of these items on the above list are not explicitly required. A vessel owner has the discretion to ask for the specific items he or she feels are important. This is significant because an owner is not generally the qualified individual who has a skillset in naval architecture or has some equivalent level of training and experience in stability.

In addition, 46 CFR 28.530(d) states

> *Units of measure, language, and rigor of calculations in the stability instructions must be consistent with the ability of the master or the individual in charge of the vessel.*

This is important considering the Captain of the SCANDIES ROSE did not have stability

[189] KG is the distance from the center of gravity (G) to the keel (K).

training and the stability instructions would have had to be carefully written so that a captain operating the SCANDIES ROSE could understand the intricacies of loading the vessel for the voyages into regions where the dangers of vessel icing were common.

The regulations address commercial fishing vessel requirements for stability evaluations. According to 46 CFR 28.535, the SCANDIES ROSE should have had its stability evaluated by inclining experiment. The regulations have a provision that allowed for the 2019 stability test to be conducted with a deadweight survey to validate the previously conducted lightweight result. When the inclining experiment is done, the regulations state that American Society for Testing and Material (ASTM) F1321 "may be used as guidance for any inclining test." Again, the language in the regulations does not explicitly state that this standard must be used, which means there is no practical enforcement or quality control on naval architects performing these tests.

U.S. regulations address icing standards for commercial fishing vessels in 46 CFR 28.550. In general, they provide that the vessel's loading conditions must be evaluated for specified ice loads if the vessel operates in latitudes north of 42º North between November 15 and April 15. Alaska is above 42º North. The ice load to be applied by the naval architect for stability evaluation is 1.3 inches of ice on any horizontal projected area and 0.65 inches of ice on any vertical projected area. There is also a provision that states that the ice load may be calculated at half of the above mentioned thicknesses for vessels that operate between 42º North and 66º North. The SCANDIES ROSE stability instructions appeared to apply the full ice load for a vessel operating above 42º North.

The regulations do not explicitly call out applying ice to any gear or loads that are temporarily placed on the deck, however, it does have a generic statement that there is a way to calculate ice on non-continuous surfaces like rails, spar, and rigging with no sail affixed. Crab pots are not specifically mentioned. The crab pots with frames, mesh webbing, buoys and lines stowed inside of pots are stacked on deck when the vessel is transiting in various configurations, horizontally or vertically depending on the stowage plan the captain decides on. The Marine Board investigated the Coast Guard's previous research regarding icing on commercial fishing vessels. The Marine Board is unaware of any scientific research which had been conducted by the Coast Guard to better understand how ice forms in and on stacked crab pots on commercial fishing vessels. Specifically, the amount of weight that ice adds to a crab pot or stack of crab pots and how ice forms on a stack of pots has not been researched by the Coast Guard. More importantly, the regulatory standards for icing on crabbing vessels operating at a latitude of 56º North, similar to where the SCANDIES ROSE was operating, do not adequately address the safety of vessels carrying pots on deck in areas subject to freezing spray.

5.3.11. IMO Regulations for Commercial Fishing Vessel Stability

The Torremolinos International Convention for the Safety of Fishing Vessels (1977) was discussed at some length throughout the investigation. This convention, referred to as the "Torremolinos Treaty," provides general guidelines for the safe design and operation of fishing vessels around the world. This convention was the first to articulate some requirement

for calculating icing conditions for fishing vessels operating in far northern or southern latitudes. The United States is not signatory to this convention. As of 2019, 11 countries had ratified this document and 37 other countries had signaled their intent to ratify the most up to date version of the convention.

The icing condition language in this convention are similar to the regulations contained in 46 CFR Part 28.550, but there are two differences. First, the convention uses7.5 kg (approximately 16.35 pounds) per square meter on vertical projected areas while the U.S. regulation requires a more stringent 15 kg (approximately 33.06 pounds) per square meter. The second noted difference is that the U.S. regulation has a provision allowing for vessels to calculate ice at half the rate if they solely operate in the lower latitudes of icing, from 42° North to 66°-30' North. There is no intermediate range of latitude recognized in the convention.

5.3.12. Canadian Regulations on Commercial Fishing Vessel Stability

As part of the analysis, the investigation explored a comparable nation's fishing regulatory standards. In this effort, Transport Canada[190] was chosen since they have commercial fishing vessels operating in similar harsh marine environments to the SCANDIES ROSE. Transport Canada regulations are much more prescriptive regarding the stability requirements. Transport Canada Marine Safety and Security requires all large fishing vessels built after March 1967 to have a full stability assessments conducted. Vessels that are older than the March 1967 enter in force date, but which have been modified after that date, are also required to have a Trim and Stability book aboard.[191] These requirements apply to fishing vessels greater than 24.4 meters (approximately 80 ft) in length or 150 GTs. This means that the SCANDIES ROSE, if it was a Canadian fishing vessel, would have had to meet these stability requirements. A Canadian vessel to which these regulations apply must undergo an inclining experiment, similar to that required under U.S. regulation, and the results of that must be used to determine the stability characteristics of the vessel for several, specified conditions including:

- lightship;
- port departure;
- arrival at fishing grounds;
- half load;
- full load;
- worst operating condition affecting stability;
- worst operating with accumulated ice on topsides and rigging; and
- port after discharge of cargo with 10 percent of fuel, fresh water and stores remaining and accumulated ice on topsides and rigging.

[190] Transport Canada is the department within the Government of Canada responsible for developing regulations, policies and services of road, rail, marine and air transportation in Canada.

[191] Transport Canada Regulations: https://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._1435/page-2.html#h-516245

These specified conditions are then required to be included in the stability instruction provided to the operator or owner. The regulations set themselves further apart from the U.S. regulations by stating that these conditions must also account for all the different species they intend to fish for. The vessel owner or operator would be required to provide information to the naval architect to include the seasons of the year for the associated fishery, associated gear for fishery including pots and tackle, and other unique fish storage specifications that may impact the vessel's loading conditions.

U.S. regulations are more generalized with respect to the requirements for the stability instruction and uses broader language providing greater latitude for the naval architect providing the stability instruction. For example, the U.S. regulations require that the stability instruction provide the operator with "sample loading conditions" (46 CFR 28.530(e)(5)). This latitude disregards the intended audience of commercial fishing vessel operators who lack stability training. The Canadian requirements also have the advantage of promoting better standards for the development of the course content for future stability courses. When every mariner is given the same sets of fundamental conditions in their stability instructions, it facilitates stability course instructors' ability to provide better, focused curriculum for fishermen to follow.

5.4. SCANDIES ROSE Stability

5.4.1. Background of SCANDIES ROSE Naval Architect/P.E.

The stability evaluation of the SCANDIES ROSE was conducted by Mr. [redacted] a naval architect and professional engineer. Mr. [redacted] is licensed by the State of Washington Board for Professional Engineers and his license is currently valid. He testified that he had been performing work on vessels for over 30 years as a naval architect. He maintained the SCANDIES ROSE vessel design and stability files since roughly the 1980s and was able to provide the Marine Board some documentation for stability related work on the vessel with his associated notes.

As part of this investigation, Mr. [redacted] was questioned on the quality of his work related to a different vessel several years ago. The owner of the fishing vessel eventually sought a different naval architecture firm to get the MSC's approval and clearance from the Officer in Charge, Marine Inspection (OCMI) to operate. This vessel, which received Mr. [redacted] Professional Engineer's stamp, required over two years of work to bring the vessel into compliance with accepted industry standards. The use of a Professional Engineer's stamp is a form of certification stating that he or she had delivered a quality product that met all applicable industry and regulatory requirements. In this case, the other engineering firm reported Mr. [redacted] to the Washington Board of Professional Engineers based on questions on the quality of work he produced. The Washington Board of Professional Engineers opened an investigation into the work of Mr. [redacted] on the F/V SEA VENTURE; however, the final decision report cited ambiguity in the regulatory framework which meant they could not hold Mr. [redacted] accountable for errors in the quality of his work. The Board of Professional Engineers determined that there were no clear or substantial grounds to justify any action against Mr. [redacted] license.

In the spring of 2019, Mr. [redacted] was contracted by Scandies Rose Fishing Company LLC to

update the stability instructions required by 46 CFR 28.530 for the SCANDIES ROSE. After conducting an inclining experiment and limited stability evaluation of the vessel, the Naval Architect produced and delivered new stability instructions to satisfy this requirement. As stated in 46 CFR 28.530(d), the stability instructions may include simple loading instructions, a simple loading diagram with instructions, and/or a stability booklet with sample calculations. Regardless of format, the stability instructions should provide straight forward, but ample guidance to the master on how to load the vessel.

The SCANDIES ROSE stability instructions, referred to as a "Stability Booklet" by Mr. [redacted] included "Instructions to the Master," tank characteristics, and several pages from a textbook which contained basic explanations of stability terms and practices. While the Stability Booklet also contained results of stability computer modeling for 11 different loading conditions, it did not include instructions on the use of this information, nor did it include a rapid and simple means for evaluating loading conditions beyond the sample conditions provided.

5.4.2. SCANDIES ROSE 2019 Stability Test

Based on witness testimonies, recent events such as the sinking of the DESTINATION provided the SCANDIES ROSE management enough concern or motivation to contract a professional engineer to verify the vessel's stability in 2019. In seeking a competent person to conduct this stability update, they contacted the person who had prepared the last stability instructions, Mr. [redacted] The previous stability instructions were prepared for the previous owner of the SCANDIES ROSE, and according to interviews with Captain [redacted] SCANDIES ROSE management had not worked with Mr. [redacted] in the past in performing work on the SCANDIES ROSE. The management opted to contract Mr. [redacted] because he had previous experience with the SCANDIES ROSE and already had the ship's files and, theoretically, familiarity with the vessel.

Testimony provided by Captain [redacted] and Mr. [redacted] gave perspective on the stability test conducted for the SCANDIES ROSE in 2019. The vessel was subjected to an updated inclining experiment to validate any changes to the vessel over the years. When Captain [redacted] was asked about his interactions with Mr. [redacted] he confirmed that Mr. [redacted] never conducted a walkthrough of the vessel to account for changes in the vessel since its 1988 stability test. Overall, testimony suggested that there may have been minimal conversation about the vessel in general and no detailed report that accounted for changes in weight or equipment for the SCANDIES ROSE was generated. Mr. [redacted] did not request any documentation for additions or changes to the vessel. Despite not taking changes to the vessel into consideration and limited interactions between the owner and the Naval Architect, the inclining experiment was completed. The primary operator of the SCANDIES ROSE, Captain [redacted] was the person most familiar with the unique characteristics of the vessel in terms of weight distribution but was not consulted for input into the stability assessment. In contrast, when Captain [redacted] had another engineering firm conduct an inclining test for the AMATULI the following year, he had a much more robust conversation about the changes to that vessel.

It is not unexpected to see incremental increases in vessel weight over the lifetime of its service. This is important because weight creep, when unaccounted for, could have detrimental impacts to the accuracy of the stability test's results. When he conducted the inclining experiment, Mr. [redacted] notes indicated five points on both the port and starboard sides of the hull along the hull where he would measure freeboard on both sides of the vessel before and after the inclining experiment. The notes and associated files only indicated that he completed a portion of all 10 draft readings. After the inclining, the Naval Architect departed the vessel, completed the calculations, and sent the owner a copy of the new stability instructions. Notably, the inclining experiment was conducted in April of 2019, before the principal maintenance period was completed in May of 2019 and any changes to the vessel during this maintenance period, such as changes to the crane setups, replacement of line cutting struts, application of 65 gallons of epoxy,[192] and any of the associated weight additions or reductions were unaccounted for.

During the hearing, Mr. [redacted] testified that there were some differences between his calculations and the MSC report that were most likely due to his not calculating for downflooding. He admitted that, while onboard the vessel, he had never visually inspected for the actual location of the engine room vents located on the second level behind the bridge stairwell, which would represent downflooding points. Instead, he based his assumptions of the condition of the vessel on his prior experience with this vessel, its sister vessel, and interactions with the owner and operator. With the significant changes noted to the vessel, including the modifications to the superstructure as noted in the vessel history included in the Condition and Valuation Survey, it would have been very important to verify the downflooding angle to set limits for the computer software stability models of the vessel.

As noted in section 5.3.10 of this report, the U.S. regulations for fishing vessels do not prescribe any requirements for how a stability test or inclining test needs to be conducted. However, the ASTM F1321-92 standard is an accepted industry practice for inclining tests. The scope of this standard addresses the phases of the test which includes the initial walk through and survey, the freeboard and draft readings, and conducting the inclining experiment. The walk through and survey part of the inclining experiment involves the naval architect taking a comprehensive inventory of the condition of the vessel. They should ensure that the tanks are either pressed full with liquid or completely empty with limited exceptions. The naval engineer should take note and consideration of the depth of the water, overall weather, wind, current, sea state, the location of the vessel, nearby traffic, and other contributors. During the walk through, the naval architect should ensure the crane is in place or will be appropriate for the experiment and ensure that movable items are secured and will not shift on board. Before and after the shifting of the sample weight, the freeboard or draft readings should be done at 10 different locations, five on each side, which are uniformly distributed about the side of the vessel. The experiment should have already identified the sample weight, where it will be placed, and to where it will be shifted during the experiment. The person conducting the experiment would shift the weight up to seven times and observe pendulum changes that indicate movement of the vessel and exactly how the weights shifted. During this last phase, the naval architect should record the weights of persons conducting the test and where they were during each test. The results of conducting the experiment

[192] CG Exhibit 111, Pg. 1 and 2

properly should give the naval architect consistent results to successfully evaluate the vessel's static stability in order to create comprehensive stability instructions.

The MSC Technical Report analyzed all of the supporting documentation for both inclining experiments done in 1988 and 2019, respectively. Mr. [redacted] and Mr. R. Merrill conducted the 1988 inclining experiment and Mr. [redacted] alone, conducted the 2019 inclining experiment. The MSC Technical Report noted deviations from ASTM applicable standards for conducting inclining experiments. Between the two inclining experiments, there were common deviations such as precision error, not taking enough freeboard readings, not recording all draft marks, and not including coaming heights or deck thickness into account for freeboard measurements. The MSC Technical Report noted that additionally in 2019, "no report, data sheets, or calculations are provided."[193] The conclusion in the MSC Technical Report is that both stability tests "fail to conform to the ASTM F1321-92 standard [for inclining experiments] and fail to provide a basis for the resulting lightweights and centers of gravity used in subsequent stability analysis"[194] of the Naval Architect.

5.4.3. Marine Safety Center's Analysis of the SCANDIES ROSE Stability

The Coast Guard's MSC is staffed with various types of engineers, including naval architects who are specially trained in performing stability assessments of vessels. On or about June 2013, the MSC published "Guidelines for Commercial Fishing Vessel Stability," to provide guidance on the review of commercial fishing vessel stability. The guidelines were directed at the commercial fishing vessel industry and were designed to help owners and naval architects understand the applicability of the regulations and highlight stability topics specific to fishing vessels. This document is unique in the sense that other guidelines provided by the MSC are directives to vessel designers and owners who require MSC approval for vessel construction or modifications. Commercial fishing vessels are generally not required to submit plans for review to the MSC. However, upon request from the OCMI, the MSC will review stability instructions from vessels that have been involved in a marine casualty, or upon request by the local OCMI when the attending marine inspector questions the seaworthiness of the vessel using their experience, training, and best judgment. This has been exercised several times following significant modifications to fishing vessels. The resultant MSC review of a fishing vessel's stability is returned to the OCMI in order to better inform them in their evaluation of the subject vessel.

Following the sinking of the SCANDIES ROSE, MSC staff, using information provided from the Naval Architect who completed the stability assessment of the vessel in 2019 and 1988 and information gathered by the Marine Board, completed a stability analysis of the SCANDIES ROSE, dated February 8, 2021. The MSC Stability Report included three appendices with loading conditions and also included and addendum on Asymmetrical Icing SCANDIES ROSE dated February 22, 2021.

HYPERLINK: Enclosure (2) contains hyperlink (7) which is a combined package consisting of the MSC's Stability Report for the SCANDIES ROSE, including three

[193] CG Exhibit 59, Pg. 48
[194] CG Exhibit 59, Pg. 33

appendices, and the MSC's addendum to the original report addressing asymmetrical icing.

The completed MSC report compared their results to that of the vessel's stability instructions completed in 2019. The report concluded that the 2019 stability assessment did not accurately model the vessel's poop deck and forecastle enclosed volumes and apparently neglected downflooding.[195] The analysis used the existing computer software model of the SCANDIES ROSE, pictures of the vessel, and all of the plans provided by the naval architect of the vessel. Upon initial examination, the original computer software data provided by the Naval Architect resembled the lines plan provided to the investigators. However, upon analyzing the lines plan when overlaid over a properly scaled recent photo of the vessel, the MSC was able to identify clear differences that would impact the results of the stability analysis. Photos of the SCANDIES ROSE taken in 2019 show that the transom and forward extent of the poop deck had less buoyant volume and the forecastle may have increased slightly in buoyant volume. The MSC concluded that the computed reserve buoyancy of the SCANDIES ROSE was approximately 1.8% less than what was shown in the Naval Architect's computer software model output that was used to render the stability instructions from 2019. The reduction of reserve buoyancy and inaccurate modeling of its location could potentially impact modeled righting arm curves for each loading condition, having a measured reduction in the vessel's natural ability to right itself from a heeling moment caused by wind, waves, or other external factors. This is just one example of the errors in the stability characteristics that were included in the Naval Architect's report.

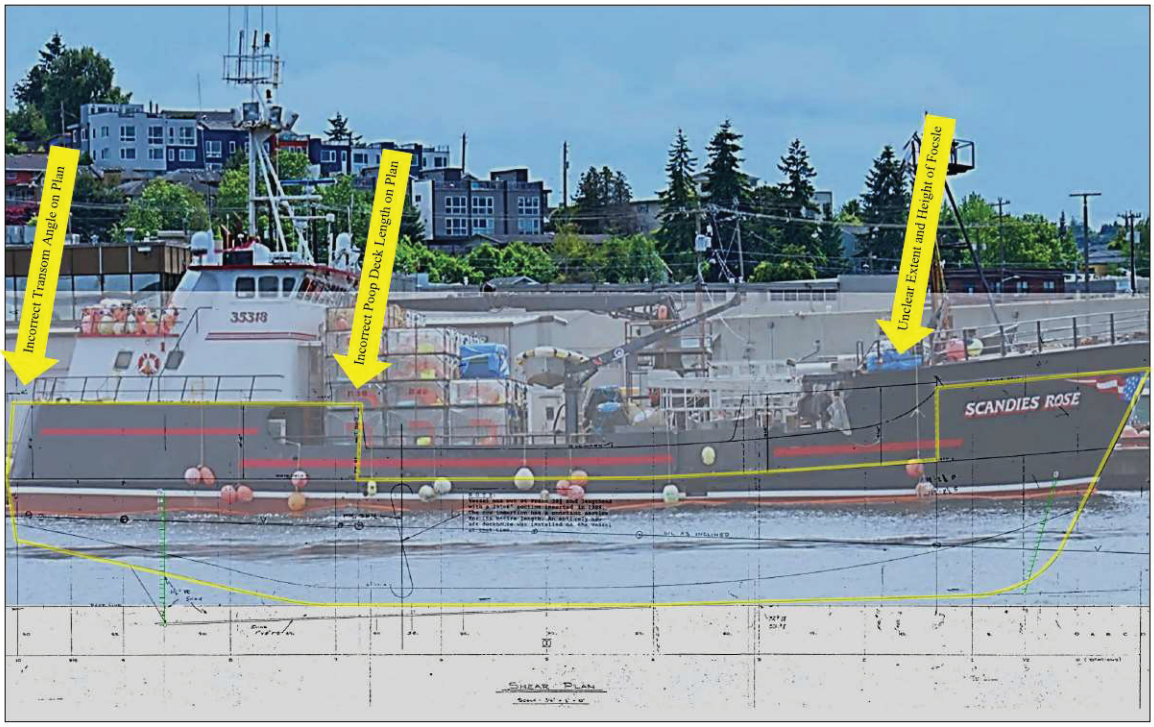


Figure 81 – 2019 Profile photograph of SCANDIES ROSE with Lines Plan profile overlaid with watertight envelope highlighted in yellow and large profile differences in the poop and forecastle called out. (CG Exhibit 059, Pg. 9)

[195] CG Exhibit 59, Pg. 91

The MSC analysis found that Mr. [redacted] 2019 stability assessment did not accurately model the bulwarks' height, and the instructions significantly under-predicted the superstructure windage area. The MSC Technical Report evaluated the windage area for the hull, superstructure, and the addition of pots. The model did not indicate number of pot tiers, but did show an extent, or height of crab pot loading which was shown to be approximately in line with the deck of the wheelhouse. The amended windage model contained in the MSC Technical Report was 34% greater than that seen in Mr. [redacted] provided model. This provides a significant impact on the wind heel criteria and would provide an 83% increase in the calculated heeling moment compared to the Naval Architect's provided report. This is significant and coupled with the accumulated ice loads would decrease the stability of the vessel.

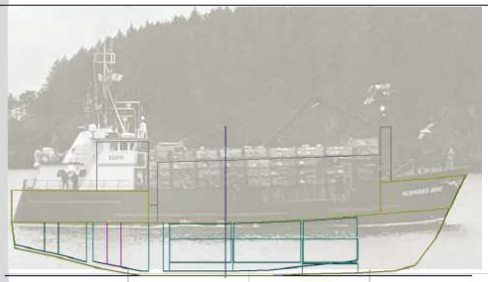
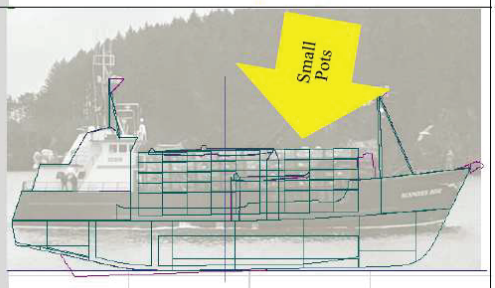
F/V SCANDIES ROSE Computer Model Comparison	Reference A - Provided GHS Computer Hull Model				CG MSC GHS Computer Hull Model			
Windage Surface Areas and Heeling Moments								
Windage Part	*Tiers of Pots*	*Average Height Above Waterline (feet)*	*Exposed Area (sq.feet)*	*Heeling Moment with 53 knot wind (foot-Long Tons)*	*Tiers of Pots*	*Average Height Above Waterline (feet)*	*Exposed Area (sq.feet)*	*Heeling Moment with 53 knot wind (foot-Long Tons)*
Hull Windage at 13.0' Draft	not noted	6.1	796.0	27.5	5	7.0	681.5	31.8
Superstructure Windage	not noted	11.0	1056.0	66.3	5	14.8	933.0	84.9
Crab Pot Windage	not noted	17.0	252.4	24.9	5	13.4	1211.2	100.2
Totals	not noted		2104.4	118.7	5		2825.6	216.9
Hull Windage at 13.0' Draft					4	7.0	681.5	31.8
Superstructure Windage					4	14.8	933.0	84.9
Crab Pot Windage					4	11.9	1005.1	74.5
Totals					4		2619.6	191.2
Hull Windage at 13.0' Draft					3	7.0	681.5	31.8
Superstructure Windage					3	14.8	933.0	84.9
Crab Pot Windage					3	10.2	816.7	52.6
Totals					3		2431.2	169.2

Figure 82 – Windage area comparisons between Mr. [redacted] provided electronic vessel model on the left, and the MSC Technical Report's representative model showing impacts of differences in the model for windage area impacts. (CG Exhibit 059, Pg. 29)

The MSC report noted "significant differences were observed when comparing […] tank capacities," "mathematical errors," and "significant errors and omissions in hydrostatic modeling" in the 2019 stability assessment.[196] The 2019 instructions included 11 sample vessel loaded conditions, all of which "failed to meet stability criteria," for at least one of the stability criteria when evaluated by the MSC. Figure 83, below, shows the initial loading conditions without regard to icing conditions and which stability criteria failed for each loading condition.

[196] CG Exhibit 059, Pg. 91-92

Model: MSC/Large Pots	Light ship Characteristics Source: MSC (Table 24)		
	Lightweight:	578.33	Long Tons
	Vertical Center of Gravity:	15.26	Feet above Baseline
	Longitudinal Center of Gravity:	0.52	Feet Aft of Amidships

Loading Condition	Light-ship Source	Hydro-Statics Model	Displace-ment (LT)	Trim (ft aft)	Minimum Freeboard (feet above waterline)	PATRICIA LEE Winter Loadline Height (feet abv waterline)	§28.565 Water on Deck	§28.570 Intact Righting Energy	§170.173(c) Alternate Intact Criteria	§28.575 Severe Wind and Roll
2019 Stability Book Condition 1: Max Consumables, 208 Large Pots, Holds 2 and 3 full	MSC 2019	MSC Large Pots	1109.26	-2.13	0.62	-0.74	FAIL	FAIL	FAIL	FAIL
2019 Stability Book Condition 2: 75% Consumables, 208 Large Pots, Holds 2 and 3 Full	MSC 2019	MSC Large Pots	1062.94	-1.54	1.08	-0.29	FAIL	FAIL	FAIL	FAIL
2019 Stability Book Condition 3: 50% Consumables, 208 Large Pots, Holds 2 and 3 Full	MSC 2019	MSC Large Pots	1049.71	-0.45	1.26	-0.14	FAIL	FAIL	FAIL	FAIL
2019 Stability Book Condition 4: 25% Consumables, 208 Large Pots, Holds 2 and 3 Full	MSC 2019	MSC Large Pots	1015.35	-1.87	1.51	0.14	FAIL	FAIL	FAIL	FAIL
2019 Stability Book Condition 5: 10% Consumables, 208 Large Pots, Holds 2 and 3 Full	MSC 2019	MSC Large Pots	988.89	-2.16	1.74	0.38	FAIL	FAIL	FAIL	FAIL
2019 Stability Book Condition 6: Max Consumables, Tendering, All Holds Full	MSC 2019	MSC Large Pots	1184.26	-3.82	-0.27	-1.51	PASS	FAIL	FAIL	PASS
2019 Stability Book Condition 7: 75% Consumables, Tendering, All Holds Full	MSC 2019	MSC Large Pots	1137.95	-3.20	0.29	-1.01	PASS	FAIL	FAIL	PASS
2019 Stability Book Condition 8: 50% Consumables, Tendering, All Holds Full	MSC 2019	MSC Large Pots	1083.69	-4.06	0.69	-0.52	PASS	FAIL	FAIL	PASS
2019 Stability Book Condition 9: 25% Consumables, Tendering, All Holds Full	MSC 2019	MSC Large Pots	1049.33	-5.45	0.80	-0.23	PASS	FAIL	FAIL	PASS
2019 Stability Book Condition 10: 10% Consumables, Tendering, All Holds Full	MSC 2019	MSC Large Pots	1022.87	-5.75	0.99	0.01	PASS	FAIL	PASS	PASS
2019 Stability Book Condition 11: Crabbing, 3 Holds Full, 168 Large Pots	MSC 2019	MSC Large Pots	1196.86	-9.05	-28.49	-6.47	FAIL	FAIL	FAIL	FAIL

Figure 83– 2019 loading condition[197] evaluation using MSC's hydrostatics model and MSC's calculated light ship weight and centers of gravity from 2019 with large crab pots modeled. (CG Exhibit 059, Pg. 84)

[197] Red colors in the boxes indicate that the condition failed regulatory requirements. Yellow indicates a failed alternative stability standard. The following alternative standards were considered by MSC: 1) 6" minimum freeboard is required in SCANDIES ROSE's stability instructions, but is not a CFR requirement; 2) International Load Line Convention is an alternate to Subpart E (according to 46 CFR 28.500, the entire subpart would not apply if the vessel had a load line), SCANDIES ROSE was not reviewed to this or issued a Load Line, but sister ship PATRICIA LEE was, and; 3) 46 CFR 28.570(c) allows uninspected fishing vessels like SCANDIES ROSE to meet the stability requirement for inspected vessels in Subchapter S instead of 46 CFR 28.570(a). It doesn't appear that Mr. [redacted] used this alternate standard.

MSC's analysis indicated that the estimated casualty voyage conditions, while nearly meeting all of the 2019 stability instructions, failed to meet regulatory stability requirements. Ultimately, the report concluded that the "magnitude and asymmetry of the icing during the casualty voyage was likely different than the symmetric" icing criteria referenced in the regulations, and that "this could have made the stability worse than calculated during the casualty voyage.[198] The MSC Technical Report specifically determined that the weight of icing found in the notes and files from the Naval Architect was 24% to 27% lower than what MSC modeled. This difference in weight is compounded if the SCANDIES ROSE had placed five tiers of crab pots on deck "because this ice weight is located at a high vertical center of gravity, it has a significant impact on SCANDIES ROSE's stability."[199] The Marine Board determined that the overall cumulative effects of errors in modeling the buoyant volume, windage area, pot distribution, and application of regulatory icing requirements put SCANDIES ROSE in a loading condition that could not produce the required restoring moment required to right the vessel. As a result, SCANDIES ROSE was in a potentially unsafe condition with respect to vessel stability at the time of departure and for the duration of the voyage. Compounding this scenario were the effects of off-center ice accumulation and icing weight that increased during the voyage and that exceeded regulatory assumptions.

The MSC report referred to the "Vents Fills and Sounding Tubes" drawing of the SCANDIES ROSE and compared these drawings to pictures of the SCANDIES ROSE to determine the potential downflooding points. These are important to evaluate to determine the critical thresholds of heel, or list, where progressive flooding would significantly deteriorate the stability of the vessel. The MSC analysis determined that the lowest downflooding point was at the engine room vents located behind the ladderwell leading to the pilothouse on either side of the vessel. During testimony, the representative for the MSC stated that these engine room vent trunks were downflooding points. If this is the case, downflooding into the vessel could initiate through one of the port or starboard vent trunks at "heeling angles as low as 30 degrees."[200] Mr. [redacted] testified that the downflooding point was the main engine vent stack and the vessel would not experience downflooding until a really high heeling angle. Mr. [redacted] file of notes on the vessel states heeling angle would have to be almost 90 degrees to allow water into the vessel. Specifically, he stated the following about the downflooding point

> *I asked the owner about the air intake for the engine room. That's normally where the downflooding point would be. He told me that it was up high, right behind the steps from the pilot house. I think it's in the side of the stack. It's real high, and maybe 2 or 3 feet off the fender line, so I didn't feel like it would be a factor and I didn't put it into the computer model.*[201]

The Naval Architect further admitted that he did not personally verify these intakes or check to see if there were additional possible downflooding points. As a result of his assumption on the location of the downflooding points, he did not include them in his stability calculations

[198] CG Exhibit 059, Pg. 92-93
[199] CG Exhibit 059, Pg. 25
[200] Mr. [redacted] MBI Hearing Transcript, Pg. 637
[201] Mr. [redacted] MBI Hearing Transcript, Pg. 1861

or booklet. Hockema Whalen Myers Associates, Inc. questioned the MSC's analysis on the basis of their assumption that the downflooding point was at these vents. They state in a letter to the Marine Board that the vent trunks could run to the center of the vessel prior to going into the engine room.[202]

During the course of this investigation, the Marine Board spoke with multiple people familiar with the vessel, and reviewed extensive documentary evidence to examine the vessel's history. The Marine Board concluded that the vent trunks most likely did pass immediately down vertically into the engine room and the MSC's analysis of an approximate 30 to 35 degree downflooding point is accurate. Based on the survivors' testimony, the heel of the vessel was approaching these angles by the time they mustered on the bridge to don immersion suits. The downflooding point identified by the MSC is shown in figure 84, below:

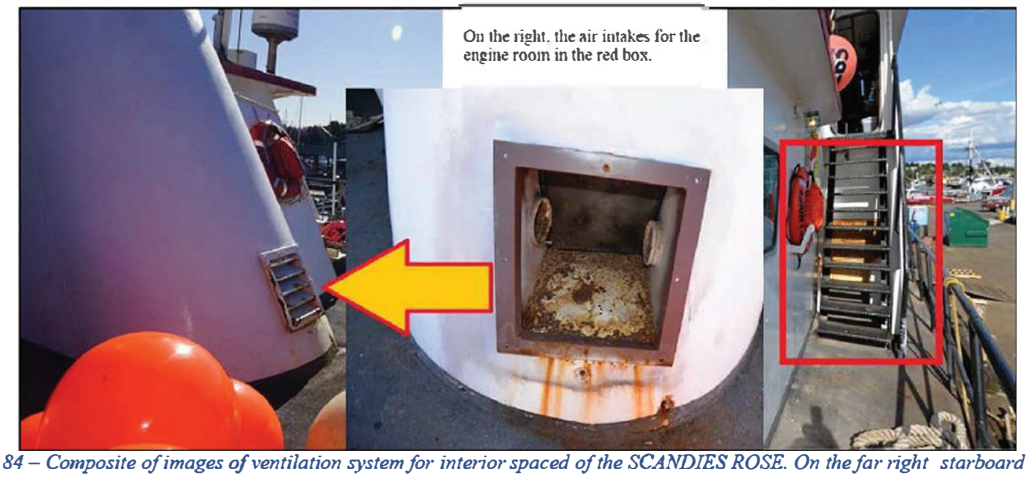


Figure 84 – Composite of images of ventilation system for interior spaced of the SCANDIES ROSE. On the far right starboard ladderwell to bridge with vent intakes shown behind the ladder that are referenced by the MSC Technical Report as being the downflooding point. Center and left, assumed downflooding point described by the Naval Architect in testimony at the Marine Board Hearing. (Source Fisherman Maritime Surveys Inc. photos, various years)

The MSC electronically modeled the downflooding point and the results of a 35-degree heel is shown in Figure 85, below:

[202] Exhibit CG 134, Pg. 7

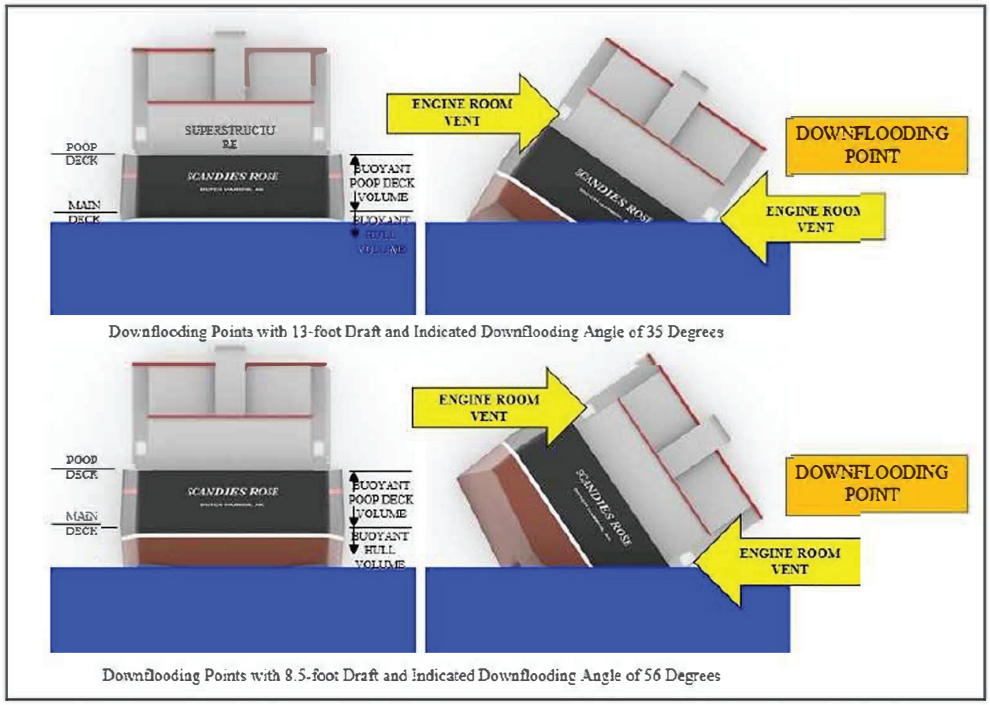


Figure 85 – Identifications of the SCANDIES ROSE for various drafts of 13.5 ft and 8.5 ft showing the effect on where the water might enter the air intakes for the engine room which the MSC identified as the "downflooding point." The Naval Architect that conducted the 2019 stability assessment discounted these flooding points without examining them as a potential point for flooding. He did not physically look at these intakes and assumed later when the SCANDIES ROSE sank that they led to the centerline of the vessel and would have negligible effect on potential downflooding. (Source Coast Guard)

The letter to the Marine Board from Hockema Whalen Myers Associates, Inc. also had a firm statement regarding apparent errors in the MSC's application of the regulations in way of applying icing conditions and the downflooding angle. To this point, a panel composed of three naval architects testified during the Marine Board Hearing. When discussing how ice regulations are applied to calculations, they did not have firm answers because the regulations are ambiguous. The panel admitted that naval architects have had to make assumptions or use their judgment to determine the safest and most practical way to apply the regulations. The current regulations are inadequate and fail to provide sufficient guidance.

5.4.4. SCANDIES ROSE Stability Instructions to the Master

The results of the stability analysis produced by the Naval Architect were summarized with a one page summary entitled the "Instructions to the Master." In the 12 separate instructions provided, the master is given a bare minimum of information to safely operate the vessel. These instructions were generated based on an inclining experiment that failed to meet ASTM F1321-92 standards and contained large errors noted in the MSC analysis. As was indicated in Section 5.3.10, these instructions should contain important items to help inform the master of necessary information regarding stability. Some of the things that are listed under the regulations could not be clearly found in the SCANDIES ROSE Instructions to the Master. For example, the instructions lacked guidance on how to use the information in the stability instructions. It also lacked basic characteristic information about the vessel, such as a general arrangement plan indicating the downflooding points, vents, allowable weights, and watertight closures. It also failed to provide lightweight data for the vessel. In totality, the Instructions to the Master that were provided only gave one clear statement regarding how

the upper tier of pots should not obscure wheelhouse visibility and very generic advice on maintaining the stability which lacks specific, usable information.

With regards to crab pots, the master was informed that the SCANDIES ROSE could carry as many as 208 crab pots with an average weight of 835 pounds each. This number is only reduced to 168 pots if all three holds are flooded. At the time of the accident voyage, the vessel was carrying approximately 195 pots, so strictly based on the provided 2019 Instructions to the Master, the SCANDIES ROSE would have seemingly been safe for icing conditions up to the limits provided in the regulations previously mentioned. However, the Naval Architect's icing weight assumptions were inaccurate, as indicated in the MSC analysis. This results in uncertainty regarding the accuracy of safe pot loading totals noted in the Instructions to the Master.

At the time of the SCANDIES ROSE's last Safety Compliance Check in October 2019, the vessel was loaded with 185 pots. A sampling of the 7 ft x 8 ft x 34 in crab pots were weighed and were found to weigh 863, 799, and 800 pounds, respectively. This averaged out to 820.6 pounds per pot so by that measure, an operator of the SCANDIES ROSE would feel confident that they were acting in compliance with the Instructions to the Master document. However, the MSC found through spatial analysis of the deck area that the number of pots approved in the Instructions to the Master would not fit in four tiers of pots. In order to achieve this number of pots, they would have to add a fifth tier. The Instructions to the Master do not specifically limit the Master to four tiers and only states that the first tier of pots may be stacked on edge. However, closer analysis of the loading diagrams provided in the rest of the stability instructions only indicate four tiers and none of the tiers would go above the bottom of the wheelhouse windows. Placing a fifth tier of pots would obscure bridge visibility and add significant weight above the center of gravity for the vessel, negatively impacting the stability of the vessel.

5.4.5. Examples of Stability Instructions for Other Alaskan Crab Vessels

As part of the analysis, the Marine Board compared stability instructions products from different naval architect sources. After a formal request from the Marine Board, Hockema Whalen Myers Associates, Inc. provided the stability booklets/instructions for two different vessels, one produced prior to the sinking of the DESTINATION and one produced after the DESTINATION casualty.[203] For the scope of this analysis, the Marine Board focused on the F/V BOUNTIFUL's stability booklet and instructions which were generated in August 2019 before the SCANDIES ROSE's final voyage. The BOUNTIFUL shares some similarities to the SCANDIES ROSE in that it has an aft wheelhouse, was built in the 1970s, targets some of the same species, and operates in similar environments in Alaska. The BOUNTIFUL is approximately 36 ft longer than the SCANDIES ROSE, so the actual technical analysis conducted by the Hockema Whalen Myers Associates, Inc. is not addressed in this analysis as it would be inappropriate to compare the stability details for each set of stability instructions. However, the general content, format, and the instructions to the master will be addressed in this analysis.

[203] As a matter of record, these documents were combined and assigned as CG Exhibit 134.

While reviewing some of the differences between the SCANDIES ROSE and BOUNTIFUL stability instructions, it is important to understand the regulations for these documents. The regulations provided in 46 CFR 28.530(d) lists 13 items which may be found in the stability instructions. The regulation does not require any specific item below to be included and, in effect, leaves it to the judgment of the naval architect or owner requesting stability documentation. The list of items which may be included in the stability instructions, per 46 CFR 28.530(d), are as follows:

(1) A general description of the vessel, including lightweight data;
(2) Instructions on the use of the information;
(3) General arrangement plans showing watertight compartments, closures, vents, downflooding angles, and allowable weights;
(4) Loading restrictions, such as diagrams, tables, descriptions or maximum KG curves;
(5) Sample loading conditions;
(6) General precautions for preventing unintentional flooding;
(7) Capacity plan or tank sounding tables showing tank and hold capacities, centers of gravity, and free surface effects;
(8) A rapid and simple means for evaluating any specific loading condition;
(9) The amount and location of fixed ballast;
(10) Any other necessary guidance for maintaining adequate stability under normal and emergency conditions;
(11) A general description of the stability criteria that are used in developing the instructions;
(12) Guidance on the use of roll limitation devices such as stabilizers; and
(13) Any other information the owner feels is important to the stability and operation of the vessel.

The stability instructions provided for the BOUNTIFUL gave the captain clear guidance that was easy to read in just a couple of pages. At the end of that section, the company that produced the instructions had a signature line as indicated in the figure below.

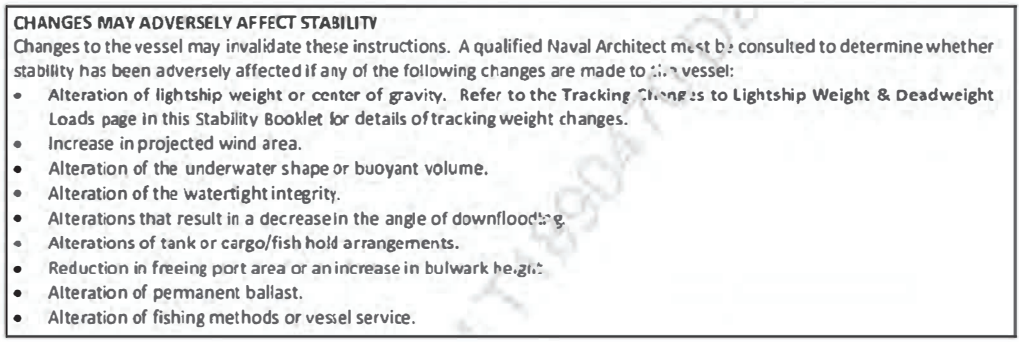
OPERATOR SIGNATURE
By signing below, I acknowledge that I have read and understand the **Stability Instructions** contained herein. I further acknowledge that physical changes to the vessel and/or operational loads may adversely affect the vessel's stability, and those changes must be reviewed by a qualified Naval Architect.
(Signature and date of initial recipient/vessel's master)
(Signature and date of subsequent recipient/vessel's master)

Figure 86 – An excerpt from the instructions to the master of a Hockema Whalen Myers Associates, Inc. stability instructions requiring the recipient/vessel master to sign the document indicating he/she has read and understands the document. (Source CG Exhibit 134)

This signature line requires the master and the initial recipient of the stability instructions to attest that they have read and understand the instructions. It further warns them that "changes [to the vessel] must be reviewed by a qualified Naval Architect." This simple block puts the onus on the operator to understand the contents of the stability instructions and offers to

make the naval architect available should the operator or captain not understand the details contained in the instructions.

The BOUNTIFUL stability instructions provide a very detailed list of changes that may affect stability, shown in figure 87, below.



CHANGES MAY ADVERSELY AFFECT STABILITY

Changes to the vessel may invalidate these instructions. A qualified Naval Architect must be consulted to determine whether stability has been adversely affected if any of the following changes are made to the vessel:

- Alteration of lightship weight or center of gravity. Refer to the Tracking Changes to Lightship Weight & Deadweight Loads page in this Stability Booklet for details of tracking weight changes.
- Increase in projected wind area.
- Alteration of the underwater shape or buoyant volume.
- Alteration of the watertight integrity.
- Alterations that result in a decrease in the angle of downflooding.
- Alterations of tank or cargo/fish hold arrangements.
- Reduction in freeing port area or an increase in bulwark height.
- Alteration of permanent ballast.
- Alteration of fishing methods or vessel service.

Figure 87 – An excerpt from the instructions to the master of a Hockema Whalen Myers Associates, Inc. stability instructions for the BOUNTIFUL. (CG Exhibit 134, Pg. 17)

These instructions are general guidance to the end-user, the operator, and owner of the BOUNTIFUL, and they are designed to give the vessel personnel an understanding of when they may need to reengage the naval architect to evaluate the validity of their current stability instructions. As stability of a vessel is dependent on so many variables, it would be unreasonable to provide an exhaustive list of reasons that stability instructions should be updated. However, this list at least provides the owner and operator some perspective on the complexity and dynamic nature of stability and advises them that they have a responsibility to engage a qualified naval architect to help determine if there are adverse effects or changes to the vessel and its overall stability.

The SCANDIES ROSE stability instructions, in contrast, had one singular statement: "No modifications to the vessel, such as adding or removing ballast or other weights is to be performed without first determining their effect on stability."[204] This vague statement lacked amplifying detail that could help an untrained mariner understand the implications of this broad guidance.

The requirements outlined in 46 CFR 28 state that the instructions to the master may include the lightweight data or, in other words, the unloaded displacement of the vessel. The stability instructions for the BOUNTIFUL list this in the first part of the instructions section as shown in figure 88, below.

	Crabbing		Pot Cod Fishing	
Displacement	1,066.21	Long Tons	1,047.21	Long Tons
Longitudinal Center of Gravity (LCG)	88.89	Feet Aft of Frame 0	88.04	Feet Aft of Frame 0
Transverse Center of Gravity (TCG)	-0.11	Feet off CL (-Port/+Stbd)	-0.11	Feet off CL (-Port/+Stbd)
Vertical Center of Gravity (VCG)	18.57	Feet Above Baseline	18.50	Feet Above Baseline

Figure 88 – An excerpt showing lightweight characteristics from the Instructions to the Master of a Hockema Whalen Myers Associates, Inc. stability instructions for the BOUNTIFUL. (Source CG Exhibit 134, Pg. 17)

[204] CG Exhibit 036, Pg. 5

The information contained in this table is important for the safe operation of the vessel for any mariner as it is a snapshot in time of the vessel's recorded characteristics based on an inclining experiment. Of note, the table includes information for the different types of fishing that the BOUNTIFUL might be engaged in, crabbing or pot cod fishing. The SCANDIES ROSE did not meet the requirements of 46 CFR 28.535(d) as the incline test was not performed in accordance with ASTM standards. Additionally, the data in the accompanying information in the stability instruction never specifically called out the lightship characteristics and did not clearly define the centers of gravity. Instead, the stability instructions provide a table of hydrostatic properties based on the hull form and how much displacement in long tons is represented by different observed drafts and trim. The other values of the table provide some context to how that hull form acts in the water. This table, as shown in figure 89, below, requires a certain degree of training or coaching to understand, none of which was provided to the operator of the vessel.

19-05-13 10:01:45 Page 1
GHS 6.44

SCANDIES ROSE

HYDROSTATIC PROPERTIES
No Trim, No Heel, VCG = 0.00

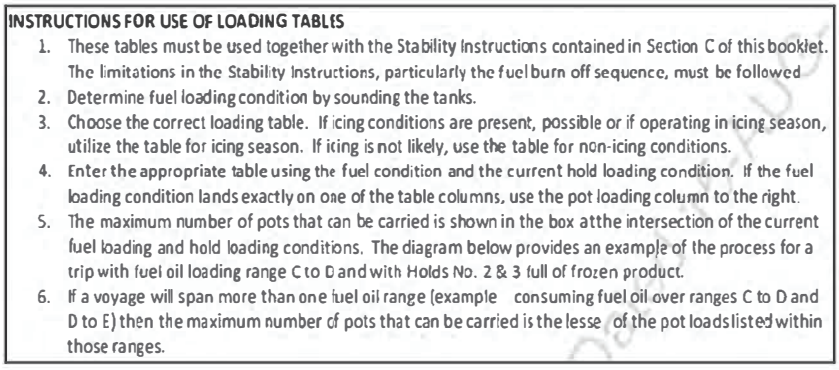
LCF Draft	Displacement Weight(LT)	Buoyancy-Ctr. LCB	VCB	Weight/ Inch	Moment/ LCF	Deg trim	KML	KMT
8.500	578.11	1.37a	5.20	8.28	4.82a	1738.24	172.3	19.08
8.750	603.08	1.51a	5.34	8.33	4.89a	1769.76	168.1	18.76
9.000	628.19	1.64a	5.48	8.38	4.96a	1802.13	164.4	18.49
9.250	653.46	1.77a	5.62	8.43	5.03a	1835.38	160.9	18.26
9.500	678.87	1.88a	5.76	8.48	5.06a	1866.42	157.5	18.05
10.000	729.99	2.09a	6.04	8.53	4.92a	1899.51	149.1	17.57
10.250	755.66	2.18a	6.18	8.55	4.86a	1915.72	145.2	17.37
10.500	781.28	2.27a	6.32	8.55	4.97a	1911.86	140.2	17.19
10.750	806.96	2.35a	6.46	8.58	4.92a	1927.17	136.8	17.04
11.000	832.70	2.43a	6.60	8.60	4.86a	1942.68	133.7	16.89
11.250	858.52	2.50a	6.73	8.62	4.81a	1958.42	130.7	16.77
11.500	884.40	2.57a	6.87	8.64	4.75a	1974.38	127.9	16.66
11.750	910.34	2.63a	7.01	8.67	4.69a	1990.55	125.3	16.56
12.000	936.36	2.68a	7.14	8.69	4.64a	2005.95	122.8	16.47
12.250	962.45	2.73a	7.28	8.71	4.58a	2023.57	120.5	16.40

Distances in FEET.-------Specific Gravity - 1.025.-----------Moment in Ft-LT.
Draft is from Baseline.

Figure 89 – An excerpt from the 2019 stability instructions for the SCANDIES ROSE showing the hydrostatic properties associated with the modeled hull form. (Source CG Exhibit 036, Pg. 32)

The BOUNTIFUL stability instructions have a dedicated paragraph that speaks to ice loads. This is provided for the operator as a means to help understand the negative impact to stability and danger created by ice loads on a vessel. The purpose of this information is to explain how much weight an operator should account or assume for when determining their vessel stability condition while out at sea. This can affect both hull ice loads and pot ice loads for a particular vessel. Most importantly, it states the extremely dangerous nature of ice in bold letters, further directing the operator to take immediate action to remove ice.

In the timeframe prior to the loss of the DESTINATION and the SCANDIES ROSE, operators of commercial fishing vessels did not typically attend or receive specialized training on stability. Furthermore, the regulations did not require this training for most commercial fishing vessel operators. Thus, the best industry practice to provide instructions to the operator of the vessel on the use of the stability instruction becomes that much more critical. The BOUNTIFUL stability instructions included a detailed guide to help mariners follow how the tables should be used. The written instructions use an example to walk the user through how they are written and applied. These instructions are in figure 90, below:



INSTRUCTIONS FOR USE OF LOADING TABLES

1. These tables must be used together with the Stability Instructions contained in Section C of this booklet. The limitations in the Stability Instructions, particularly the fuel burn off sequence, must be followed.
2. Determine fuel loading condition by sounding the tanks.
3. Choose the correct loading table. If icing conditions are present, possible or if operating in icing season, utilize the table for icing season. If icing is not likely, use the table for non-icing conditions.
4. Enter the appropriate table using the fuel condition and the current hold loading condition. If the fuel loading condition lands exactly on one of the table columns, use the pot loading column to the right.
5. The maximum number of pots that can be carried is shown in the box at the intersection of the current fuel loading and hold loading conditions. The diagram below provides an example of the process for a trip with fuel oil loading range C to D and with Holds No. 2 & 3 full of frozen product.
6. If a voyage will span more than one fuel oil range (example consuming fuel oil over ranges C to D and D to E) then the maximum number of pots that can be carried is the lesser of the pot loads listed within those ranges.

Figure 90 – An excerpt from the stability instruction for the BOUNTIFUL showing the written instruction for using the loading tables. (CG Exhibit 134, Pg. 20)

The SCANDIES ROSE stability instruction mentions ice only two times. First, when stating that the vessel can carry "a total of (208) 835 pound crab pots" and that "this applies to icing or non-icing conditions." The second time is when the instructions state the master is responsible "to exercise prudent seamanship, giving consideration to the…ice conditions."[205] Otherwise, ice is only mentioned one more time in the entire stability instruction, where the Naval Architect scanned in two pages from an unknown source that provides limited additional guidance. In these pages, included in the appendix to the stability instruction, it states that "ice formation or carrying a high, heavy deckload reduces stability by raising the center of gravity. Overloading reduces stability by decreasing freeboard."[206] These instructions on icing are vague in nature and failed to effectively alert the master to the dangers of icing in the same manner as the more detailed and complete icing information provided in the BOUNTIFUL stability instructions.

In comparison, written instructions to the BOUNTIFUL operator are supplemented by a screen capture of a page from their stability instructions. The conditions for fuel oil are provided to show different ranges of consumption. The user is directed to follow a column and applicable rows to identify the number of pots they can carry in the applicable conditions. These are done for different fisheries evaluated for icing and non-icing conditions separately in the booklet, so the operator has a sufficient tool to explain how each condition affects their limits on pot carriage. This supplemental visual guidance is shown for reference in figure 91, below:

[205] Exhibit CG 036, Pg. 5
[206] Exhibit CG 036, Pg. 35

CRABBING – POT LOADING TABLE (NON-ICING CONDITIONS)

TANKS	A 98% FO (139,522 Gal.)	B 72% FO (102,259 Gal.)	C 50% FO (71,732 Gal.)	D 32% FO (45,281 Gal.)	E 8% FO (10,962 Gal.)
FODB1.P/S	98%	Empty	Empty	Empty	Empty
FODB2.P/S	98%	Empty	Empty	Empty	Empty
FODB3.P/S	98%	98%	Empty	Empty	Empty
FOWT4.P/S	98%	98%	98%	75%	28%
FODB5.P/S	98%	98%	98%	50%	Empty
FOAT P/S	98%	98%	Empty	Empty	Empty
FODT C	98%	98%	98%	98%	98%
HOTK.S & HOFWD.S	98%	50%	50%	50%	10%
LUBE.P (Fwd & Aft) & BOILER.S	98%	50%	50%	50%	10%
DIRTYOIL C	10%	50%	50%	50%	98%
FWDT.P/S	100%	100%	100%	70%	15%
FWWT.P/S	100%	55%	28%	Empty	Empty

	LOAD CONDITION	Fuel Oil A to B		Fuel Oil B to C		Fuel Oil C to D		Fuel Oil D to E	
C-0	Hold No. 2: Empty Hold No. 3: Empty Crab Live Tank: Empty	Tiers	Pots	Tiers	Pots	Tiers	Pots	Tiers	Pots
		MD 8	294	MD 8	294	MD 8	294	MD 7	250
		PH 7	44	PH 7	44	PH 7	44	PH 5	35
		Total	338	Total	338	Total	338	Total	285
C-1	Hold No. 2: Empty Hold No. 3: Empty Crab Live Tank: Full Seawater	Tiers	Pots	Tiers	Pots	Tiers	Pots	Tiers	Pots
		MD 8	294	MD 8	294	MD 8	294	MD 8	286
		PH 7	44	PH 7	44	PH 7	44	PH 6	42
		Total	338	Total	338	Total	338	Total	328
C-20L	Hold No. 2: 125,000 lb frozen crab Hold No. 3: Empty Crab Live Tank: Full Seawater	Tiers	Pots	Tiers	Pots	Tiers	Pots	Tiers	Pots
		MD 8	294	MD 8	294	MD 8	294	MD 8	294
		PH 7	44	PH 7	44	PH 7	44	PH 7	44
		Total	338	Total	338	Total	338	Total	338
C-23	Hold No. 2: 125,000 lb frozen crab Hold No. 3: 125,000 lb frozen crab Crab Live Tank: Empty	Tiers	Pots	Tiers	Pots	Tiers	Pots	Tiers	Pots
		MD 8	294	MD 8	294	MD 8	294	MD 8	294
		PH 7	44	PH 7	44	PH 7	44	PH 7	44
		Total	338	Total	338	Total	338	Total	338
C-23L	Hold No. 2: 125,000 lb frozen crab Hold No. 3: 125,000 lb frozen crab Crab Live Tank: Full Seawater	Tiers	Pots	Tiers	Pots	Tiers	Pots	Tiers	Pots
		MD 8	294	MD 8	294	MD 8	294	MD 8	294
		PH 7	44	PH 7	44	PH 7	44	PH 7	44
		Total	338	Total	338	Total	338	Total	338
C-23LL	Hold No. 2: 125,000 lb frozen crab Hold No. 3: 125,000 lb frozen crab Crab Live Tank: Full Seawater Stbd Live Tank: Full Seawater	Tiers	Pots	Tiers	Pots	Tiers	Pots	Tiers	Pots
		MD 8	294	MD 8	294	MD 8	294	MD 6	235
		PH 7	44	PH 7	44	PH 7	44	PH 4	28
		Total	338	Total	338	Total	338	Total	263

1. This Loading Table is subject to the restrictions outlined in the attached **Stability Instructions**.
2. Abbreviations: (Gal.) Gallons, (Lb) Pounds, (LT) Long Tons of 2,240 Lb, MD Main Deck, (No.) Number, PH = Process House

For Icing Conditions, reduce the deck load as shown on the next page.

Figure 91 – An excerpt from the stability instruction for the BOUNTIFUL showing the visual reference to the instruction for using the loading tables. The mark ups in red are part of the BOUNTIFUL stability instructions on how to perform calculations. (Source Exhibit CG 134, Pg. 20)

Overall, the BOUNTIFUL stability booklet and instructions included all of the listed items in 46 CFR 28.530 with exception of instructions on the use of roll limiting devices such as stabilizers, likely because the BOUNTIFUL was not outfitted with them. The stability

instructions for the SCANDIES ROSE as shown in finding of fact 4.2.165 of this report, in stark contrast, lack six of the 13 items listed in 46 CFR 28.530(d), and are scant in three others. The stability instructions provided by the Naval Architect were insufficient in the details necessary to safeguard the operation of the vessel with particular regard to the dangers of icing and the identification of downflooding points. The documents lacked the details and accuracy to allow the master of the vessel to make appropriate safety and loading decisions.

5.5. Effects of Commercial Pressure on Vessel Operation

5.5.1. Derby vs. Rationalized Fishing

The commercial fishing industry is impacted by a number of factors including, but not limited to, regulations, fishery season lengths, start dates, price for the catch, and overhead costs of vessel operations. These commercial pressures all had some effect on the SCANDIES ROSE, competing against the safety needs of the operation.

NOAA defines "derby" fishing/race to fish as "fishing conditions characterized by short seasons and severe competition for fish, often resulting in low profits and harvests that exceed sustainable levels."[207] Pacific cod is a fishery that is currently managed as a derby style fishery. Rationalization, on the other hand, is a term that generally describes a management plan that results in an allocation of labor and capital between fishing and other industries that maximizes the net value of production by setting quotas.[208] Crab rationalization set quotas for species like opilio crab and significantly reduces the commercial pressure in fishing operations.

During the MBI Hearing, an ADF&G representative provided testimony regarding the potential impact of commercial pressure on the safety of fishing operations regarding a fishery that went from derby to rationalized management

> *… when the shift in 2005 occurred from more of a limited access or derby-style fishery to rationalized fishery occurred…the number of boats participating in a fishery, substantially decreased. We went from an average of sometimes 250 to 300 boats, to what is now closer to 65 vessels that actively participate in the fishery.*
> *Q. So is one of the byproducts, the intended byproducts, of this shift to the quota system the improvement of the safety of operations?*
> *A. I think that was one of the primary drivers of shifting away from a derby-style fishery towards rationalization…one of the downsides of derby-style fisheries are vessels are functionally competing against each other. And so there's a tendency to push harder if the weather was poor, or conditions were such that was not conducive to being on the fishing grounds. But for fear of losing out on opportunity and catch, boats would oftentimes push to get there. So one of the primary motivators were to provide some stability for the fishery, flexibility for the fishers to be able to harvest their portion of the quota at a time that makes the best sense for them, and ultimately to improve safety within the fishery, among other things.*[209]

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[207] https://www.fisheries.noaa.gov/national/sustainable-fisheries/glossary-catch-shares
[208] [redacted]. Development of rationalization programs in the North Pacific groundfish and crab fisheries. (2003)
[209] Mr. [redacted], MBI Hearing Transcript, Pg. 966

The open season to fish Pacific cod has been shrinking over the years which has, in turn, created more pressure for any fishing vessels who have wanted to participate in that fishery. In testimony, the NOAA fishery witness stated

> *... the closure date in 2020 was January 15th. And that was the same in 2019. And that's the shortest season that we've seen for the fishery*.[210]

The SCANDIES ROSE left Kodiak, AK rigged to fish for cod using pots. Pacific cod does not historically fetch a lucrative price compared to fisheries like opilio crab, yet there was an incentive for the SCANDIES ROSE to get underway despite extreme inclement weather conditions. While there were no plans by Governmental agencies to establish a quota system for Pacific cod, there was speculation Pacific cod would become rationalized like the BSAI crab fisheries. Based on that speculation, the owners and operator of the SCANDIES ROSE planned to land a catch of cod in the first cod season in 2020, January 1 through January 15, and thus, establish a catch history.

The Marine Board examined how the potential of a future rationalization of the pot cod fishery created commercial pressure and may have impacted the decision makers of the SCANDIES ROSE. In the MBI Hearing, the majority owner was asked about the upcoming plan for the 2020 season

> *A.…we primarily focused on opilio, we'd like to get a quick start on opilio and neglected cod for several years.*
> *Q. ... could you tell us why you chose to do that for several years and why you -- why the SCANDIES ROSE was going to shift to cod for that season?*
> *A. Sure, sure, we fish the crab because our main quota share owner, the person that we -- who provided probably 60 percent of our crab, didn't want us fishing cod. He wanted to get his opilio caught, so we would just -- and we needed that, we needed the crab to fish much more than we needed the relatively meager paycheck of cod. And the reason why we shifted this over the past year was because of the threat of rationalization, there's some -- a portion of the industry wanted to turn the cod fishery, Bering Sea cod fishery, into a quota, individual quota fishery, and since we didn't have any recent, very recent deliveries, we just thought it was prudent to go make a trip.*[211]

The SCANDIES ROSE Captain and the management company wanted to land a catch of Pacific cod in the beginning of the 2020 season in hopes that the record of landing that catch and other past catches of cod might lead to a quota if the Pacific cod fishery became rationalized. In establishing the catch history, the owners and operators of the SCANDIES ROSE would have improved their chances of guaranteeing quota. A quota in the future would translate into a longer season to fish in, thereby reducing commercial pressure in the long-term. When asked about the potential shift of the Pacific cod fishery to a rationalized program similar to BSAI crab fishing, the NMFS representative testified

[210] Ms. [redacted] MBI Hearing Transcript, Pg. 975
[211] Captain [redacted] MBI Hearing Transcript, Pg. 29

... in order for something to move into a catch-share program, it has to be, you know, reviewed and analyzed and approved by the North Pacific Fisheries Management Council. And in 2019, or 2018, industry did go to the council, some of them did, and asked that the fishery be moved into a quota-share program. The council, at that time, chose not to move forward with that action. And so, as of right now, there's no scheduled plan by the North Pacific Fisheries Management Council to move forward with a quota-share program for this fishery.[212]

Had the accident not occurred, the SCANDIES ROSE intended to land the single catch of Pacific cod, then re-rig the pots to fish for opilio crab—a more profitable fishery.

The opilio species shifted to a rationalized management system in 2005 as part of the BSAI crab fishery. Once that happened, NMFS issued harvesters (vessels and owners) a quota share of the ACL, which was based on their catch history and participation in the fishery during the previous years. The quota, also known as an individual fishing quota (IFQ), gave the harvester a guarantee to a percentage of the catch. Since each vessel now knew beforehand how much crab they could catch, this would help eliminate the competition between harvesters and mitigate the "race for fish." In other words, the rationalized system allowed the vessels to catch their quota at any point during the season potentially reducing the commercial pressure for fishing operations.

The Coast Guard's Report of Investigation (ROI) for the DESTINATION sinking contains the following language about fishing operations for crab and the importance of the change-over to rationalization.

Unlike in the Olympic system where operators would carry as many pots as possible to improve the ability to quickly locate and catch crab in the intensely competitive derby fishery, the CR system affords operators more time to harvest the catch. From a safety perspective, the extended season allows operators to take the time needed to prepare their crews and vessels, and to delay departure or shelter in protected areas to avoid hazardous weather conditions. It also means vessels need not hold maximum catching power and can significantly reduce the number of pots loaded onboard. Apart from carrying fewer pots, the number of pot lifts required decreased, allowing for a reduction in the fishery pace that affords crews more opportunity for rest and reducing fatigue.[213]

There is no single defined method to establish the allocation of quotas when a determination is made to shift a fishery from derby style fishing to a rationalized management system. In the case of fisheries that have been rationalized, multiple variables were factored into the distribution of quota shares. Some factors include past participation in the fishery, catch history, and number of landings. The factors considered in rationalization discussions vary from fishery to fishery. Catch history was one of the factors that influenced the decision of

[212] Ms. [redacted] MBI Hearing Transcript, Pg. 967
[213] Coast Guard's Report of Investigation into the Sinking of the Fishing Vessel DESTINATION, https://media.defense.gov/2019/Mar/03/2002095494/-1/-1/0/REPORT%20OF%20INVESTIGATION%20FISHING%20VESSEL%20DESTINATION.PDF

the SCANDIES ROSE owners and operator when deciding on the fishing plans for the accident voyage.

The plan for the SCANDIES ROSE was to fish in the Bering Sea for the first Pacific cod season of 2020 and pass on the second Pacific cod season later in the year. Since the Scandies Rose Fishing Company LLC did not have a recent delivery of cod, this first cod catch was important to the long-term plans of the SCANDIES ROSE Captain and the management company. The Marine Board believes that the last minute crew change which contributed to the delayed departure and the demand to get started cod fishing in the remainder of the short available window of time in the new year added significant pressure and impacted the decision making for the SCANDIES ROSE to get underway for the accident voyage despite the forecasted weather.

5.5.2. Resultant Pressure Due to Delayed Departure from Kodiak

Based on testimony, the plan was to have the vessel fishing for cod on or about January 1, 2020 when the season opened in the Bering Sea. The last minute changes in crewing of the vessel delayed departure and resulted in the vessel being "late" for arrival to begin cod fishing in the Bering Sea. Once crew finally arrived, the vessel again delayed departure for approximately six hours to get a fair tide to transit Whale Pass and then out into the Shelikof Strait.

Mr. [redacted] testified about the upcoming fishing season and how the weather and urgency to produce a catch record played into the Captain's decision to get underway instead of waiting for better weather.

> *Q. Okay. And so, speaking of weather, any discussion on weather prior to departure?*
> *A. Oh, yeah. We knew it was going to be bad.*
> *Q. Anyone express any concerns about --*
> *A. We all did. We all did. It was like, you know, it's kind of dumb to go out. This is a hurricane. But they -- the cod season started. It starts on January 1st, and we had like 3- or 4-day run. So we were already going to be late, and this might be the last derby year of the cod fisheries, so -- and they go off catch history so they get more quota. So it was really crucial to get there and get as much pounds as we could.*[214]

Identifying the final crew to be hired and getting the crew onboard for the voyage would delay the departure until the evening of December 30, 2019, and that would put arrival on the fishing grounds later than originally planned. As the vessel waited to depart, one of the survivors testified about overheard communications in the wheelhouse with the vessel management personnel about the delay in departure and the need to get the vessel out to the cod fishing locations in the Bering Sea

> *Q. Did you ever overhear a conversation while the boat was still in Kodiak between* [redacted] *and any of the* [redacted] *Management about getting out cod fishing?*
> *A. Yeah. He -- I don't know exactly who he was talking to, but a couple different times he was in the wheelhouse, and I was just -- I think I was filling out my contract, one, and he*

[214] Mr. [redacted] MBI Hearing Transcript, Pg. 1062

kept mentioning that he's under a lot of pressure to get out of town. Like, we got to get out of town. [redacted] wants us out of town, is what he said specifically.
Q. Well, I'm talking right now about a conversation. Did you overhear a conversation with someone about getting out of town? And who was this other person?
A. I don't -- I just overheard him say, like saying like, yeah, and we're leaving and, you know, just that kind of conversation. Again, I don't know if that was [redacted][215] or [redacted] I was under the assumption that it was [redacted][216]

It is the opinion of the Marine Board that the delayed departure caused by last minute crewing challenges and the plan to fish for cod created pressures on the Captain to get underway for the accident voyage rather than wait out the forecasted weather or seek shelter from the hazardous weather along the route.

5.5.3. Captain's Financial Investment in the Vessel/Fishing Operations

In the final days before the departure for sea from Kodiak, the Captain had made an arrangement to purchase the minority owner's share of the SCANDIES ROSE and had sent a check to the minority owner to cement the transaction as a down payment. All of the details for the final transaction were arranged as the SCANDIES ROSE departed Kodiak. The Captain wanted to have a greater say in the decisions relating to the operation and management of the vessel. With a greater share in the company, he would have that authority to have more influence in decisions affecting fishing and vessel operations.

Along with the Captain, all of the crew had a direct investment in the outcome of the voyage as their income would be derived from a share in the voyage, less the operating expenses for the trip such as fuel, provisions, and other expenses. The Captain's investment in the success of the accident voyage was now compounded by his plans and obligations in the purchase transaction.

5.5.4. Balancing Safety and Profit: Decision Not to Create a Deck Alleyway

Vessel operators have to balance safety and profit when making decisions which affect the safety of operations. One example of this is the loading of the SCANDIES ROSE. Loading to near maximum pot capacity against the concern for access to various points aboard the vessel was a decision the Captain faced. An alleyway allowing access from the superstructure forward to the bow of the vessel was not created when loading pots onboard for this voyage. In figure 92, below, aboard an unidentified crabbing vessel similar to the SCANDIES ROSE, the operator of the vessel created an alleyway to increase his crews' ability to more safely move fore and aft. This has been identified as a fairly common practice in the crabbing fleet which would also reduce the pot capacity by the number of pots needed to create the alley or alleyways. The alleyways are the width of the height of a pot lying on its side, creating an opening about three feet where the crew could walk through the pot stack and move safely fore and aft.

[215] Investigator's note – referring to Ms. [redacted]
[216] Mr. [redacted] MBI Hearing Transcript, Pg. 1141

Figure 92 – An alleyway in the lower tier of an unidentified commercial fishing vessel operating in an Alaskan winter. The red arrow points to the alleyway. View is looking toward the stern of the vessel. (Source CG Exhibit 093, with redactions and mark up)

Without an alleyway on deck, the SCANDIES ROSE crew could not walk forward and aft on the main deck but would have to move fore and aft over the top of the exposed pot stack. This could only be accomplished safely in more favorable weather and sea conditions and was an evolution that was still associated with some level of risk. Even getting forward to use the ground tackle or other equipment on the bow would be difficult in an emergency. One of the survivors who loaded the pots testified about loading the SCANDIES ROSE and differentiated between other boats who had created an alleyway or alleyways

> *A. So basically any space on deck was filled, you know, and that's actually -- to, to go back to what you asked me about the other aft house boat I worked on, this was different to me because once you stack this boat out, there's no alleyway. And like, on the Wizard, for instance, they have a way to actually come in to the gear room into the house. This boat, once you stacked it out, you had to climb up over the stack to even get back to the house. There was no, you know, pass through.*[217]

The decision to load the vessel's crab pots without creating a means for the crew to safely go forward was a latent unsafe condition that led to significant consequences which impacted subsequent decisions on the accident voyage. The lack of an alleyway left no way for the crew to accurately assess the ice that was accumulating or to gain rapid access to the forward parts of the vessel to clear the ice from the most heavily iced portions of the vessel and the pot stack. As the heavy freezing spray continued to negatively affect the vessel's stability, and believing that he could not send the crew over the top of the pot stack to safely break the building ice, the Captain decided to wait until reaching shelter to address the icing.

[217] Mr. [redacted] MBI Hearing Transcript, Pg. 539

5.5.5. NIOSH Recommendations and Commercial Fishing Operation Safety

Various entities make recommendations to improve the safety for commercial fishing operations such as the one undertaken by the SCANDIES ROSE crew. Despite the soundness of these recommendations, they come at a cost in terms of expenses and time. This sometimes inhibits owners and operators from putting those recommendations into practice.

One governmental group, NIOSH, uses the marine accident data provided by the Coast Guard and other sources to identify the causes of marine accidents and then analyzes that data to make recommendations to the commercial fishing industry. In 2017 they published a summary of the CFV accidents that occurred in Alaska. The following recommendations, extracted from the NIOSH proposed recommendations in that 2017 accident summary, if put into practice, would have in all likelihood increased the chances for the survival of the SCANDIES ROSE and its crew.

> *Take a marine safety class at least every five years. Safety training for fishermen is available, affordable, and saves lives. All fishermen should learn and know how to use basic lifesaving equipment like immersion suits, life rafts, EPIRBs, and fire extinguishers to improve their chances of survival in an emergency.*[218]

Based on the records obtained by the investigation, only three of the seven-person crew had attended any type of safety training classes over the years preceding the accident. Periodic training would have potentially involved refreshing the memories of the crew with critical training for vessel emergencies and refreshing their memories on the details of survival equipment, such as the contents of the equipment stored in a liferaft and other important items.

None of the crew had attended any stability training. Stability is an essential factor for the safety of any vessel operation. The fundamentals of stability, downflooding points, dangers of an unidentified list, and icing are even more essential when fishing far from rescue in an environment where icing and extremes of weather are routine. The NIOSH recommendations continue

> *Ensure watertight integrity of the vessel. The hull and through-hull penetrations should be regularly inspected and maintained. Doors and hatches should remain closed while underway, especially in rough seas. Maintain and test high water alarms before each trip.*[219]

There was testimony by one of the survivors that the after hatch to the starboard pipe alley below the main deck was left open when the vessel was underway. Furthermore, the NIOSH recommendations state

[218] https://www.cdc.gov/niosh/docs/2017-171/pdf/2017-171.pdf, Pg. 6
[219] https://www.cdc.gov/niosh/docs/2017-171/pdf/2017-171.pdf, Pg. 6

Maintain proper watch. Vessel owners and operators should create fatigue management policies and use watch alarms to prevent groundings and collisions.[220]

The Captain of the SCANDIES ROSE on the accident voyage did not effectively communicate standing orders to the vessel crew. This was especially important in the fact that two of the crew had never worked with the Captain or on the vessel before. Additionally, the survivors talked about the effects of the workload and fatigue associated with the loading. One of the survivors was so fatigued that in post-accident analysis his level of fatigue would have affected his decision making to the level of his being, or nearly being, legally intoxicated.

NIOSH also addressed stability and made recommendations on this topic, stating

Adhere to stability instructions (if applicable). A naval architect should be consulted periodically to review safe loading limits of the vessel. Vessels should always be loaded in compliance with their stability instructions.[221]

The owner of the vessel did adhere to this recommendation in getting a new stability document and the included instructions to master contained in that 2019 stability instructions. However, the instructions prepared by the Naval Architect contained errors and the "instructions" were vague. The Naval Architect gave the majority owner, the recipient of the 2019 stability document, an opportunity to comment on the contents of the document. There is no evidence that the owner asked for the instructions to be clarified or more detailed in regards to the maximum pots to be carried and the effects of icing that would most likely be encountered in the conditions that the SCANDIES ROSE would crab in.

5.6. Captain as Operator / General Work Experience

5.6.1. Regulatory Requirements and Experience

Captains of commercial fishing vessels operating beyond the boundary line of the tonnage of the SCANDIES ROSE do not require any form of certification, credential, or other qualifications to determine the level of competency to carry out their responsibilities and duties, with the possible exception of a Federal Communications Commission (FCC) Radio Operator's License to operate the vessel radios.[222]

Captains engage in fishing with these vessels in the harshest of marine environments, generally far from any potential rescue forces. These fishing vessels are generally complex vessels, in essence, small ships with sophisticated electronics, equipment and other systems. Like the captains, there are no requirements for the persons serving as ad hoc engineers.

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[220] https://www.cdc.gov/niosh/docs/2017-171/pdf/2017-171.pdf, Pg. 6
[221] https://www.cdc.gov/niosh/docs/2017-171/pdf/2017-171.pdf, Pg. 6
[222] The FCC Radio Operator's Permit is a once in a lifetime card that requires passing a test to obtain this permit. This is required if the vessel has a Single Sideband Radio.

5.6.1.1. The Captain was a highly experienced Alaskan commercial fisherman and was well respected by the fishing community. He had been working as a fisherman for his whole career. He had been captain of several other vessels. Testimony from the majority owner described him as a "great Captain, and great fisherman."[223]

Several other witnesses talked about Captain [redacted] in a similar manner. He was highly experienced in working in Alaskan waters with those unique challenges. Testimony would indicate that he was intimately familiar with the operation of all of the equipment on the vessel.

5.6.2. Familiarity with the Accident Route

The SCANDIES ROSE typically operated out of Dutch Harbor, AK up into the Bering Sea. During the course of the accident year, the vessel had been from the Bering Sea down to Kodiak, down to the Seattle area for maintenance work, back to Dutch Harbor, and then from the Bering Sea to Kodiak after the early 2019 crab season. The trip from the Bering Sea to Kodiak was made on generally the same track as the accident voyage but in the opposite direction. Fishing vessel captains who were interviewed in the MBI Hearing said that Captain [redacted] was very familiar with the waterway, the Shelikof Strait and to the west. Multiple fishing vessel captains testified that freezing spray and strong frigid winds blowing out of the bays and from the glaciers to the north in the Aleutian Chain created a situation where a vessel could very rapidly begin to gather dangerous icing.

An examination of the route was carried out with information supplied by other fishing vessel captains to determine what would constitute adequate anchorages in the prevailing weather the SCANDIES ROSE encountered in the Shelikof Strait and to the west, heading to Sutwik Island.[224]

For the timeframe of the accident voyage, there was a heavy freezing spray forecast in effect. Surviving crewmembers reported light icing and glazing ice on their respective early watches on December 31, 2019. On the Captain's six-hour watch which was believed to be from 8:00 a.m. until 2:00 p.m. on the accident day, there were good anchorages available offering protection from the reported northwest wind as indicated in figure 93, below. Despite the options for refuge early in the day and worsening weather conditions, the vessel maintained course and speed. The RUFF & REDDY, heading in the same direction as the SCANDIES ROSE, had sought the shelter of Nakchamik Island less than 30 NM to the west of Sutwik Island early in the morning on the accident day due the icing they were experiencing.

Based on the Captain's experience, he should have considered areas along his route to find safe shelter from the severe weather that was forecast to include heavy freezing spray. With areas of safe refuge previously identified, he could have communicated to the crew different waypoints along the route that would be critical for decision making. The Marine Board could not uncover any information about a plan, any communication with the crew about areas of refuge, or any actions taken to seek shelter until the evening of December 31, 2019,

[223] Mr. [redacted] MBI Hearing Transcript, Pg. 767
[224] Exhibit CG 137, Shelter and Anchorage Correspondence Post SCANDIES ROSE Hearing_Redacted

when the Captain assumed the navigational watch and the determination was made that it was too dangerous to send the crew out to remove ice. At that point when the Captain opted to seek the shelter of Sutwik Island, the vessel was already in a dangerous stability condition, listing heavily to starboard.

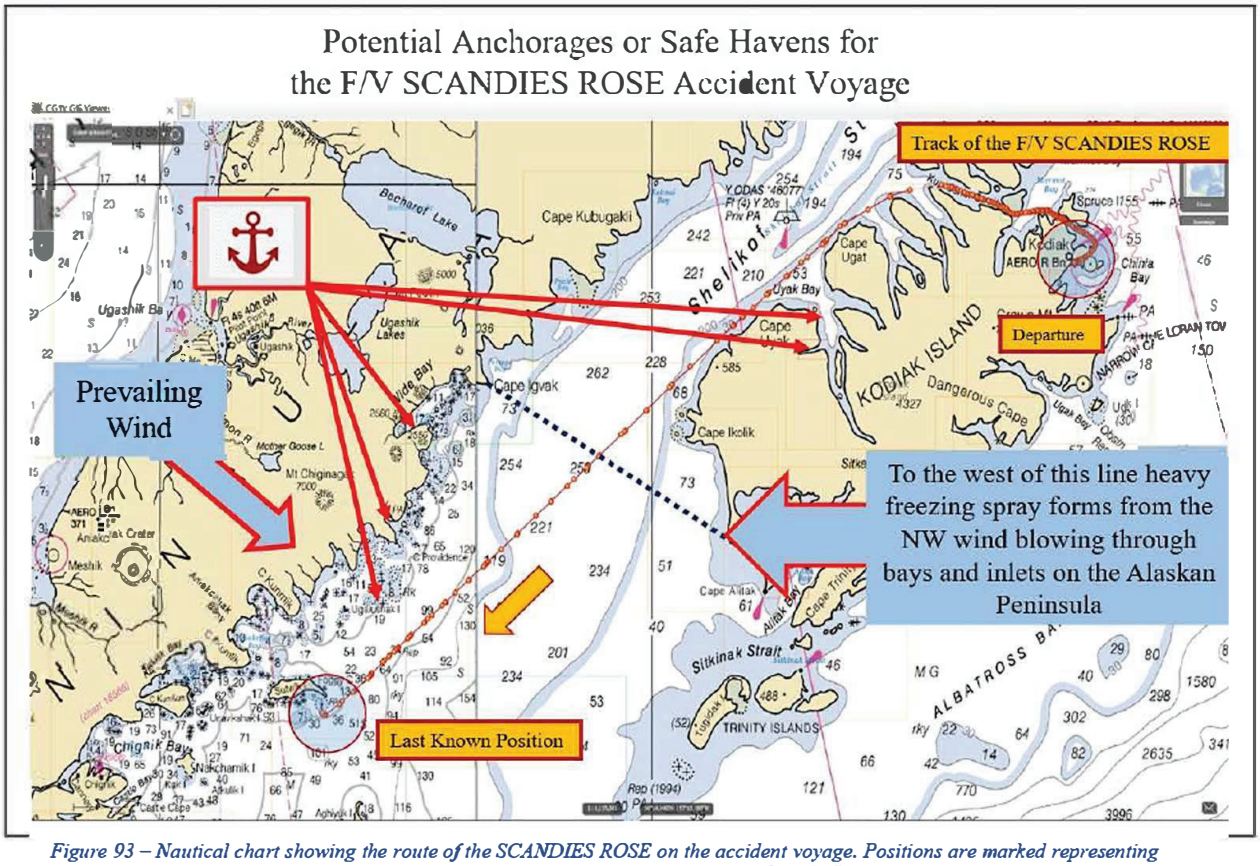

Figure 93 – Nautical chart showing the route of the SCANDIES ROSE on the accident voyage. Positions are marked representing reportedly good anchorages in northwest winds similar to the weather the SCANDIES ROSE was experiencing on the accident voyage. Other bays or inlets along the track were reported to offer poor anchor holding ground in the northwest winds the SCANDIES ROSE encountered. (Source Coast Guard)

5.6.3. Pre-departure Required Training and Drills

Based on testimony, Captain [redacted] was well respected when it came to safety. In the case of the required drills and training, he had completed Drill Instructor training in 2009 and led the pre-departure training and instruction prior to the vessel departing Kodiak on December 30, 2019.

Through testimony, the surviving crewmembers explained that the survival suits, EPIRB, flares, general alarm, and liferafts were all discussed in the onboard training prior to departure. They both testified that only the newest crewmember, Mr. [redacted] was tasked to demonstrate putting on a survival suit as part of the training while the rest of the crew observed. The Captain also instructed the crew on the use of the marine radios to make a "mayday" call in an emergency. Both survivors noted the Captain's hesitancy in testing of the EPIRB during this training citing his concern about sending an active distress signal. Of particular concern is the testimony by survivors that neither of them saw any lights activate

on the EPIRB during the Captain's attempted test of the device. Based on the Captain's training and the training of both of the survivors, the Marine Board makes note that anyone with the Drill Instructor training or basic safety training should have been aware the proper testing procedure for the EPIRB and known that a successful test would have been accompanied by a flash of the LED light.

Additionally, both of the survivors incorrectly identified the location of the EPIRB in testimony and during interviews immediately after the incident. Both men stated that the EPIRB was located on the starboard side of the vessel aft of the wheelhouse. Effective pre-departure training should have imprinted the location of the EPIRB in the memory of the crew eliminating this potentially dangerous mistake. Vessel photos and post-accident ROV footage show the EPIRB location on the port side of the vessel. During the emergency, both survivors exited the port side aft-facing door from the wheelhouse and they were a short distance from the EPIRB's mounting location. If the EPIRB was in the housing unit, it may have been possible to reach the EPIRB and release it from its housing. This would enable the survivors to keep this vital piece of survival equipment with them as they abandoned ship.

5.6.4. Confidence in the Vessel

The SCANDIES ROSE was a large, well maintained Alaskan crabbing vessel. It had withstood the rigors of the Alaskan environment since it was built in 1978. Former crewmembers portrayed their confidence in the vessel and described the SCANDIES ROSE as a "Cadillac," a "battleship," and an "incredible platform."[225]

The DESTINATION which was lost in icing conditions in the Bering Sea near St. Paul's Island in February 2017 was 98.6 feet in length and had a forward house with the pots carried aft of the superstructure. In contrast, the SCANDIES ROSE, originally built as the ENTERPRISE, was 130 ft long aft house vessel with the crab pots on the main deck forward of the superstructure.

When responding to a question about the weather forecast and the crew's discussion of the weather prior to departing, Mr. [redacted] referred to the vessel as a "tank" stating

> *A. We were all kind of just talking about it. Like, oh, great, it's going to be -- this is going to be fun, you know, and just like, you know, everybody was kind of apprehensive to go into it. I mean, but -- and then again, that boat should have been a tank and should have been able to withstand that weather. I've been in worse weather, and I mean, it was pretty bad, but it should have been able to make it.*[226]

Mr. [redacted] was asked to recount if Captain [redacted] had ever made comment on the SCANDIES ROSE's ability to handle severe inclement weather. He recalled that Captain [redacted] said, "she's a great boat. She's a tank. Go through the weather."[227]

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[225] Mr. [redacted] Mr. [redacted] testimony, MBI Hearing Transcript, Pg. 702
[226] Mr. [redacted] MBI Hearing Transcript, Pg. 1100
[227] Mr. [redacted] MBI Hearing Transcript, Pg. 1141

The Captain and crew relied on their belief that the SCANDIES ROSE was a capable of withstanding the forecasted weather which included heavy freezing spray. The Marine Board believes that this confidence in the vessel directly contributed to the Captain maintaining course and speed despite worsening conditions and ice accumulation. Additionally, the Marine Board does not believe that the Captain or crew were aware of the stability vulnerabilities which were later examined and explained in the MSC Stability Analysis.

5.7. Owner's Responsibilities

5.7.1. Repair, Upkeep, and Maintenance of the SCANDIES ROSE

A number of witnesses attested to the fact that the SCANDIES ROSE was a well-maintained vessel and effort was made to regularly haul the vessel and have a condition and valuation survey conducted at regular intervals. The evidence bears this out based on the history of repairs and maintenance that was included in the survey. The owner stated that a maintenance budget was not maintained but that needed repairs were identified and addressed when they were called for.

As the direct representative and an owner, Captain [redacted] notified vessel management of maintenance items that needed to be addressed as well as any supplies that were needed and this information was conveyed by the vessel manager to the majority owner who would evaluate and approve repairs. The vessel manager kept track of the work list and then the authorized repair list for the shipyards or external vendors.

An example of this was the repairs to the overboard waste chutes on the starboard side of the hull conducted by a welding company in early 2019. Later after heading to sea, the Captain notified the shore side managers that the repairs leaked, specifically near the forward starboard chute welds. The Captain texted the manager and majority owner photos with descriptive labels on the image while the vessel was at sea and in one of the text messages he mentions "thru the splash zone that we applied to keep from sinking last winter" and "I thought this had been repaired in the shipyard."[228] It is the Marine Board's opinion based on available evidence that the Captain was referring to the April 2019 repair work performed at dockside by Aztec Welding in Seattle. The owner then arranged for a Kodiak based welder to board the vessel at the dock and repair the leaks identified in the photos of the forward overboard waste chute on the starboard side.

There is no evidence or testimony that, upon notification of weld failures near the forward chute, anyone examined the early 2019 repair where the aft waste chute was closed off to the deck and the side of the hull with the use of welded doubler plates. This closure of the aft overboard chute was carried out by the same welder who did the welding work on the forward chute which would later have to be repaired in Kodiak by a certified welder and subjected to non-destructive testing. Captain [redacted] text messages sent ashore in November 2019 focused on the leaks coming from the forward starboard chute. The Kodiak welder cropped out the wasted metal along with the suspect porous welds and fabricated a new overboard chute, fitted it in place, welded it up and then conducted a non-destructive

[228] Exhibit CG 112, Text Messages from [redacted] Showing Void and Chute

penetrating dye test to verify the quality of the work. The welding and the follow on non-destructive testing (NDT) was done by an ABS certified welder.

Examination of the evidence, condition and valuation survey, vessel history, and invoices for recent repairs indicated that the vessel was routinely hauled out for maintenance and that repair and preventative maintenance issues were addressed as needed.

5.7.2. Company Support Personnel for SCANDIES ROSE Maintenance

At one point in testimony, a representative from Lovric's Shipyard described the vessel manager as the Port Engineer. The vessel manager did not have any marine engineering expertise to fill that position. The company had once employed a Port Engineer who passed away prior to the 2019 dry-docking. This impacted the repairs conducted to the overboard waste chutes on the starboard side that were conducted in early 2019 at Lovric's Shipyard. In the absence of a Port Engineer, the vessel majority owner supervised the repairs for the vessel. He did not ask for or require NDT of the welding work. The work originally done by Aztec Welding turned out to be unsatisfactory and allowed seawater to leak through the welds into the starboard pipe void. The crew of the SCANDIES ROSE, on a voyage in late 2019, had to enter the void and pump seawater out that was found leaking into the interior of the vessel. On November 4, 2019, the Captain sent images ashore via text message showing the extent of the leaking seams on the starboard forward overboard chute. Once the problem was identified, the company took action to resolve the issue with the forward starboard chute when the vessel reached Kodiak. There is no evidence that the work that had been performed by the same welder to close off the after chute in early 2019 was examined to determine the integrity of that repair. However, only a crewmember was left to oversee the repairs to the forward chute.

5.7.3. Guidance to Personnel Operating the SCANDIES ROSE

The Company provided some guidance to personnel employed on the SCANDIES ROSE, including written emergency instructions and oil transfer procedures. In addition, the company also ensured that the Captain and crew had stability instructions for the SCANDIES ROSE and there was guidance contained in documents that comprised the pre-season paperwork such as the Drug and Alcohol and Sexual Harassment policies. However, aside from this, there is little evidence that the company provided specific guidance to the personnel operating the vessel. There was no formal written guidance on procedures to operate the vessel, on navigation watchstanding, engine room or deck operations, fatigue reduction guidelines, or similar written procedures. These operations were stipulated by the Captain, generally verbally, and they could change based on who was serving in that role.

Management gave the Captain latitude to operate the way he wanted to run the vessel and did not provide written operating procedures for him to follow even in a general sense. Examples of areas where there was no guidance for the operation of the SCANDIES ROSE would be the loading of crab gear, the watch schedule, and voyage planning when heavy weather would be encountered. Absent standard guidance or procedures, the management team (remaining owners and vessel manager) did not know how the challenges of the voyage would be handled and the risks minimized to ensure the safety of the crew and vessel as the SCANDIES ROSE headed to sea. This was completely left to the discretion of the captain.

5.7.4. Training for the SCANDIES ROSE Crew

With the exception of the required onboard drills and pre-departure training in lifesaving operations, the company did not provide additional training for the crew. The onboard drills and pre-departure training are regulatory requirements. As part of employment, the company did not require crew to attend or be certified in any specific training related to the operation of the vessel. Additionally, the company did not require any of the crew for this voyage to have a Coast Guard MMC. Individual crewmembers could get training and instruction at facilities such as AMSEA, NPVFOA, and possibly other training institutions like the Crawford Nautical School on their own and at their own expense. The Marine Board was not able to find any evidence that any of the crew had attended the stability training courses that were offered at these training organizations.

One crewmember was required to be a "Drill Conductor" and the Captain had attended and completed that training in 2009. The two survivors had also attended Drill Conductor training, both more than five years prior to the accident. There is no specific requirement to recertify at a periodic interval for this training despite changes in technology and techniques that may have occurred over time. The Captain's training in 2009 satisfied and fulfilled the requirement for him to conduct the pre-departure training and drills.

5.7.5. Crewing the SCANDIES ROSE for Government Charters

The SCANDIES ROSE was occasionally chartered by government agencies for research work. During these charters, the vessel manager would have had to place a Coast Guard credentialed captain aboard instead of Captain [redacted] who did not hold a Coast Guard credential. The majority owner talked about these government charters in his testimony

> *And occasionally, I mean, on two separate occasions I ran the SCANDIES ROSE when there were Alaska Department of Fish and Game charters, because in their -- in their charter documents they require a licensed captain and* [redacted] *not --* [redacted] *was not licensed, I was, so I went up and ran the boat for those 35-day charters on several occasions*.[229]

Another witness, the captain of the WESTERN MARINER who is also a credentialed mariner testified

> *It's just a requirement for -- probably for the government insurance. I've done a lot of research -- I've done a lot of research programs that, you know, every -- if anybody's going to send their people on a boat, they want to send them with a licensed master.*[230]

This charter requirement ensured that a mariner who was medically fit and deemed competent through the Coast Guard credentialing process was operating this commercial vessel while government passengers or contractors were aboard. As an example, the majority owner, Captain [redacted] held a 1600 ton Oceans Master credential with a number of STCW endorsements.

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[229] Captain [redacted] MBI Hearing Transcript, Pg. 23
[230] Captain [redacted] MBI Hearing Transcript, Pg. 947

5.7.6. Company Drug/Alcohol Policy and Pre-employment Drug Screening

Part of the process of employment was for prospective company employees to complete paperwork which included a contract stipulating all the details of the duties as well as the share of the catch. Additionally, there was paperwork for medical history, sexual harassment policy, a background check, direct deposit, and other documentation.

As part of the process, employees reporting to the vessel for the season were to be drug screened. In the case of the SCANDIES ROSE, there was no requirement for the crew to be drug tested under regulation as part of a pre-season employment package. Under regulation, the crew would be subject to post casualty drug and alcohol testing after a SMI such as the sinking of the SCANDIES ROSE. The crew was also required to sign a one-page company Drug and Alcohol Policy. Crewmembers would need to sign and date the policy. The penalty for violating the policy could be discharge as stipulated in the terms and conditions in the contract. The entry for violating the drug and alcohol policy stated:

> *Violation of the Vessel's attached Alcohol and Substance Abuse policy. Prior to entering into this Agreement and immediately during the term of this Agreement, Crew Member must inform Skipper regarding any prescription drugs he/she is taking.*

The policy and contract had strong language as to the use of drugs and alcohol onboard and the penalties for a person violating the policy. Prior to signing the contract and reporting to Kodiak, crewmember [redacted] submitted to a drug test conducted and certified by a laboratory with documented results sent to the vessel manager. The last person to join the crew, Mr. [redacted] was tested aboard the vessel with an off-the-shelf five panel home drug test kit. In the case of Mr. [redacted], the test results were reported, by the Captain, to be negative for all of the drugs tested. A series of photos were sent to the vessel manager via text message prior to departure showing the test sample, comments and the results. An analysis of the text string by the Marine Board was not able to confirm negative results in this test.

After the sinking of the SCANDIES ROSE and rescue of the two survivors, the owners were required to conduct post-accident alcohol and drug testing since this accident was a SMI. The hospital would not conduct testing because that testing was not in line with the hypothermia treatment protocol. In attempting to comply with the requirements for drug testing, the vessel manager who was in the Seattle area asked the Captain's sister to assist her locally in Kodiak to acquire drug testing kits commercially. At-home style drug test kits were purchased at a store and the two survivors produced samples utilizing those kits. When examined according to the test kit manufacturer's instructions, the results showed that Mr. [redacted] sample was negative for all five drugs tested and Mr. [redacted] sample showed positive for marijuana. These test results were transmitted to the vessel manager but the test and results were not further certified by a certified laboratory. Instructions in the kit recommend that the sample be sent to a certified laboratory to verify the accuracy of the test results. This was not done. The results of these tests have not been disputed in this investigation.

In a post hearing interview, one witness was asked if he knew how Mr. [redacted] could test negative with a home test kit and then after the voyage that same individual could test positive with a similar test kit.

> Q. *... do you know why Mr.* [redacted] *would've tested positive for THC after he was rescued?*
> *A. Yeah, I can give you the honest answer on that. He told -- because I know him, they were talking about it and he told* [redacted] *-- I think he even* [redacted] *that, you know, he had smoked marijuana back home and that he wasn't going to be able to pass. He told her that multiple times, he told me, he also told* [redacted] *that and then when he got the pass -- you know, a wink and a nod pass because* [redacted] *wants to go fishing, he was even surprised because he told* [redacted] *that he was not going to -- he had just smoked weed down in Seattle, you know, the day before we came up. So that, clearly, as you probably know, stays in your system for quite some time. It doesn't just go away, so that would be my assumption there as why he tested positive. I never smelled any weed from him at all.*[231]

During the MBI Hearing, the majority owner testified about the difficulty in finding crew in the Pacific Northwest that did not use marijuana.

> *So, if we've had one guy who we know really well, we would send him up there and let him ride the boat up to Alaska, and say we're going to test you as soon as you get there. And until you get there, you can't take a watch. You can't -- you know, you can clean up the galley and you can do that, but you can't run the cranes or do any of the equipment. And we'll test you as soon as you get there. And you better pass, or else we're going to be out for a plane ride. And you're going to come right back.*[232]

The Marine Board does not believe there is enough evidence to suggest that the failed post-casualty drug test for one of the survivors indicating a positive result for the presence for THC was a direct contributing factor for the cause of this accident. However the Marine Board does note this as a "finding of concern" for the safety of operations of commercial fishing vessels. This survivor was filling a safety sensitive position as a navigation watchstander who was responsible for the safety of the entire crew and vessel while the vessel was underway at sea.

5.7.7. Oversight of the Crew for Medical Fitness by Management

Based on the size and tonnage of the SCANDIES ROSE, there was no regulatory medical fitness requirement for the crewmembers. None of the crew were required to hold a Coast Guard credential, nor did any of the crew hold a Coast Guard issued credential. If the Captain in particular had a Coast Guard credential he would have had to pass a rigorous medical examination at five-year intervals to obtain a Merchant Mariner Medical Certificate (Med Cert).[233] As part of the process of acquiring a Med Cert, the Captain's physical and detailed questionnaire would have been reviewed by medical professionals at the Coast Guard's

[231] [redacted] CG Exhibit 136, Post MBI Interview, Pg. 47
[232] [redacted], MBI Transcript, Pg. 1592
[233] 46 CFR Part 10, Subpart C

National Maritime Center (NMC). If the gross tonnage of the SCANDIES ROSE was more than 200 GT, then the captain would have had to hold the appropriate Coast Guard credential and valid Med Cert which would have required him to meet the medical fitness requirements.

The owners of the SCANDIES ROSE had a procedure and a requirement for the crew to notify management of medical issues that might impact the safety of operations as well as prescription and over the counter drugs that an individual was taking when they joined the vessel. As part of the pre-season employment paperwork, the owners relied on the crew to fill out a two-page self-assessment document on their own medical conditions. They were also required to fill out a document allowing the release of medical information so that the vessel manager could follow up on any of the medical issues that were a concern to them. Those documents were signed by the crew and they could be provided to their medical provider for follow up information. On the accident voyage, all of the crew filled out this paperwork but this was not effectively received by vessel management personnel until after the vessel was at sea. This did not give any time for vessel management to accurately assess any issues identified and documented on the provided forms. In addition, this was a self-certification allowing crew members to omit any issues that might be prejudicial to their employment for the fishing season.

As part of this investigation, the medical forms for the accident voyage crew were reviewed. The results of that examination were that one crewmember was a diabetic and required insulin to control his diabetes. The Captain acknowledged wearing glasses, hearing issues, color blindness, frequent difficulty sleeping, and a heart condition described as a murmur. Management did not have any time to analyze any adverse impact from these medical conditions based on the pace of loading and the final crewing of the SCANDIES ROSE. In the course of testimony, the majority owner was asked if he was aware of these medical conditions for the accident voyage crew and, with the exception of his knowledge of the Captain's color blindness, he was not aware of these potentially risky medical issues.

The Coast Guard has a rigorous program for medical screening for mariners operating commercial vessels who hold credentials issued by the Coast Guard.[234] For a detailed explanation for medical competency, in general, for the commercial marine industry, see section 5.8.5. of this report. When specific conditions have been identified and resolved, the NMC may issue a Medical Certificate with a waiver that is required to be adhered to while the mariner is working. One example stipulated in the MMC booklet might be that the individual must carry a spare set of glasses; another might be that the mariner gets an echocardiogram at specified intervals for any related heart condition; yet another might be a requirement for the use of a continuous positive airway pressure (CPAP) machine while sleeping aboard the vessel.

The rigorous medical oversight of the personnel working on the vast majority of commercial vessels is similar to the medical oversight in other modes of the transportation system such as rail, air, and road transportation. However, because there are no Coast Guard credential requirements for commercial fishing vessels under 200 GTs there is no medical oversight. In

[234] COMDTINST M16721.48, Merchant Mariner Medical Manual

the course of this investigation, there were several commercial fishing vessel captains interviewed who operated vessels of similar size and type as the SCANDIES ROSE that, in fact, did hold valid Coast Guard credentials.

The managers of the SCANDIES ROSE and the Captain of the vessel had the means to examine the medical issues of the crew and to follow up with the medical providers should any medical issue be identified that might impact the safety of vessel operations on the accident voyage. However, the pressing need to load, crew, and depart for the fishing grounds resulted in the documents not being available to the vessel manager until after the vessel was underway and did not allow time for the manager to review or mitigate the risks posed by any medical issues before the vessel was at sea. The majority owner when talking about the issue of diabetes of one of the crew in testimony stated

> *Q. ...prior to the accident, at what point did you become aware that one of the crew was insulin dependent?*
> *A. Did not. I did not become -- you know, if I would have found -- known that, I probably wouldn't have -- I probably would have put the kibosh on that. Yeah, at least I would have -- that would have been one that necessitated a call to a doctor, because I'm not that familiar with, you know, diabetes and the various problems with insulin*.[235]

The minority owner stated in testimony,

> *Q. Okay. Are there red flags though? So from the skipper -- from the skipper forms or from medical forms for the crew, if they do disclose a condition of some sort, does that play into the calculus of risk management for insurance?*
> *A. Well, I think it would play into that from the vessel owner's standpoint because that is one -- you know, we ask for a medical history questionnaire. And obviously if you look at the medical history questionnaire, and I'll make up a scenario, and it says I'm diabetic (indiscernible) you know, and I need insulin daily. Well, that's probably a conversation we would have with that captain and crewman saying this is probably not the job for you because what if we lose power, and your insulin can't stay refrigerated. You might want to look at something that's more shore-based versus being 30, 40 days out to sea at a time. So things like that absolutely we take into consideration and have that conversation.*[236]

Although the medial fitness issues detailed in the medical questionnaires for some of the crew members on the SCANDIES ROSE posed a risk to the vessel's operations, the issues identified were not a direct contributing factor and cause of this accident. This finding about the lack of effective oversight of the medical condition of commercial fishing crews is a "finding of concern" for the safety of operations of commercial fishing vessels in general.

[235] Captain [redacted] MBI Transcript, Pg. 1949
[236] Mr. [redacted] MBI Hearing Transcript, Pg. 192

5.7.8. Contractor Support of the SCANDIES ROSE

The owners of the vessel engaged numerous contractors to support the operation of the SCANDIES ROSE. The Marine Board focused on work done by the Marine Surveyor, Naval Architect (Qualified Individual), and Welding Contractors in the year prior to the accident.

5.7.8.1. Marine Surveyor

The owners engaged the same highly experienced Marine Surveyor for the condition and valuation surveys dating back to at least 2001. The Surveyor conducted surveys at periodic intervals with the last one conducted in April, May, and June of 2019. The survey allowed the Surveyor to examine the vessel while the vessel was out of the water for maintenance. The scope of work did not include material and hull testing or operational testing of equipment. The survey makes a note about the scope of the inspection.

> *Extent of Inspection:*
> *1. The vessel was surveyed while hauled out and subsequently while afloat.*
> *2. The vessel engines and motors were not run or tested in any way, other than a visual inspection of the equipment and mounts.*
> *3. The water, fuel, oil and ballast tanks were not entered or inspected in any way.*
> *4. Sea suctions, valves and fittings were inspected internally as far as visible.*[237]

The surveyor maintained a running list of the equipment repairs, additions, and modifications on the vessel going back to 1998. There was hull thickness gauging conducted in 2003 and in 2012. Issues identified in those tests of the hull integrity were addressed. It is important to note that the purpose and scope of these surveys is not to verify compliance with any minimum standard.

Unlike an inspected vessel, the SCANDIES ROSE was not subject to regulatory oversight by the Coast Guard or an entity acting on behalf of the Coast Guard, such as the American Bureau of Shipping (ABS). Regulatory oversight generally includes examination of the material condition of the vessel hull and machinery, firefighting and safety equipment, personnel training, and emergency drills.

5.7.8.2. Naval Architect

The Naval Architect who attended the SCANDIES ROSE as the Qualified Individual specified under the stability regulations for commercial fishing vessels created stability reports for the vessel in 1988 and in mid-2019. The majority owner testified that he decided to conduct an update of the stability information and have a stability assessment conducted based on the stability issues raised after the sinking of the DESTINATION in the Bering Sea in February 2017.

[237] CG Exhibit 004, Pg. 35

After the incline test was completed, the majority owner received the report and relied on the Naval Architect, a professional engineer, for the accuracy of the calculations contained in the report and Instructions to the Master document. In testimony, the managing owner stated

> *Q. …Were there any issues or concerns that you had with the stability report that you received in 2019?*
> *A. No.*
> *Q. No?*
> *A. No. I mean, I'm a fisherman, I'm an educated fisherman, but I'm not a naval architect or an engineer.*[238]

In response to a question in testimony, the owner stated

> *Q. … in this letter it just says, "was a bit heavier," quote/unquote, but was there any correspondence, whether verbal or written, email, where he, where the PE indicated to you what a bit heavier was? Did he ever tell you what, by how much heavier?*
> *A. No, he did not, and I didn't ask.*[239]

Weight creep is a serious concern for vessel stability especially if the lightship weight is increasing for unknown reasons. Over a vessel's lifetime, modifications, changes in equipment, and the addition of gear add weight which changes the stability characteristics of the vessel. The DESTINATION ROI makes this statement which also speaks to the lightship weight increase

> *Without conducting a reassessment or updating the originally issued stability instructions to reflect these modifications and address weight creep, the vessel's loading constraints and operating restrictions became inaccurate and obsolete.*[240]

In the case of the SCANDIES ROSE, the Naval Architect brought the unexplained weight changes to the owner's attention. This should have triggered follow up discussions between the two parties to ensure that the increased weight was accurately accounted for in the final stability instructions. Additionally, there is no information available to determine if the owner(s) had a detailed discussion about this aspect of the stability instructions with the Captain.

Despite the managing owner's best intention in getting a new stability assessment and instructions in 2019, the Naval Architect's failure to conduct a complete and accurate incline experiment in accordance with ASTM standards, failure to verify downflooding points, and vague instructions to the master did not accurately reflect the stability characteristics of the SCANDIES ROSE.

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[238] Captain [redacted] MBI Hearing Transcript, Pg. 67
[239] Captain [redacted] MBI Hearing Transcript, Pg. 1941
[240] Coast Guard's Report of Investigation into the Sinking of the Fishing Vessel DESTINATION, https://media.defense.gov/2019/Mar/03/2002095494/-1/-1/0/REPORT%20OF%20INVESTIGATION%20FISHING%20VESSEL%20DESTINATION.PDF

5.7.8.3. Welding Contractors for 2019

While the vessel was in Seattle in mid to late-April 2019, arrangements were made to have a welding contractor, Aztec Welding, attend to the two starboard waste chutes, one fore and one aft. The plan was to rebuild the forward chute and to close off the aft chute. Both these chutes penetrated the main deck and also the side of the vessel above but close to the waterline. Aztec Welding personnel completed the welding work but did not conduct NDT as a quality assurance measure to validate the integrity of the welds.

In testimony, the vessel manager explained that in order to have NDT conducted for this particular type of work, she would have needed to request it from the welding contractor. With the absence of a Port Engineer, there was a skill set gap in the company and the vessel manager said that she did not request NDT be completed on the work being done to the starboard forward or aft chutes. During the MBI Hearing, the majority owner was asked about this welding work and he testified

> *A. ...But I was the one who ultimately said that, you know, let's hire Aztec.*
> *Q. So you said, let's hire Aztec, but did you check the work? Did you accept the work?*
> *A. Well I'm not a -- you know, in retrospect, we should have -- you know, I don't know why they didn't have nondestructive testing there. That was a, that was a mistake on my part. We certainly should have had it. But then the boat went up, and I didn't hear a thing about that void until [redacted] was coming in from king crab.*[241]

In the fall of 2019 while the vessel was underway having engaged in king crab season, the crew identified seawater leaking into the starboard pipe alley that was between the fish holds and the vessel hull which required attention. The crew of the SCANDIES ROSE had to go into the void to pump out seawater that was seeping through in the area of the starboard forward overboard waste chute. The Marine Board was unable to determine if any member of the crew checked on the condition of the welds of the aft blanked off starboard overboard chute to ensure its watertight integrity after the leaks were identified where the forward chute repairs were made.

On November 4, 2019, Captain [redacted] sent ashore cell phone labeled photos showing the rust-stained seams and requested a complete repair for this area of the hull, deck, and chute structure. When the SCANDIES ROSE reached Kodiak, arrangements were made to have a marine welding contractor make repairs and fabricate a new forward chute. The welding contractor, Highmark Marine Fabrication LLC, relied on American Bureau of Shipping certified welders and the accompanying procedures. Once they were able to remove the wasted steel back to good metal, the welder cleaned and prepared the vessel surfaces for fit up and welding. The welder then measured and built a new starboard forward chute, then welded it in place. After the welding was complete, the welds were inspected and a dye-penetrant NDT was completed in compliance with ABS standards.

[241] Captain [redacted] MBI Hearing Transcript, Pg. 1922

The work and subsequent NDT testing attested to the quality of the welding work replacing the starboard forward overboard chute.[242]

Figure 94 – SCANDIES ROSE on the blocks May 2019 at Lovric's Shipyard, Anacortes, WA. "Starboard waste chute" highlighted, with inset photo showing repaired waste chute as viewed from onboard the vessel, looking outboard. Inset photo, lower right, displays the completely rebuilt starboard waste chute as repaired later in 2019 by High Mark Marine certified welders in Kodiak, AK. (Source [redacted])

In the post-accident ROV underwater survey that was conducted, one of the several areas of concern was the starboard side of the vessel. With the vessel resting on the starboard side, it was not possible for the ROV to visualize the starboard side of the hull and, in particular, the areas of concern near the forward and aft overboard chute locations.

5.8. Human Factors

5.8.1. Pressure on the Captain to Sail

The business organization of the vessel management company and the relationship between the Managing Owner and the vessel Captain was such that there was ambiguity on who played what role in directing the movements of the vessel. This created direct and indirect pressure for Captain [redacted] to get underway on the accident voyage. During testimony, Captain [redacted] was asked to explain his relationship to vessel operations. On multiple occasions, Captain [redacted] asserted that the vessel's Captain was in charge of all actions or decisions related to vessel operations, but when asked if he was in a position to override operational decisions for the SCANDIES ROSE, he answered

> *A. Not a formal veto, but..[redacted] agreed that we should do it because we couldn't pass up the opportunity, if there was going to be rationalization, we would not want to be aced out of a fishery, a fishery that Scandies Rose had a tremendous history in, a long term history.*
>
> *If [redacted] would've then said to me well, I'm not fishing cod, I would've said well, actually, I kind of do have veto power at that point and I'll bring in another captain to fish cod and then you can get the boat back for opilio, but that would never happen.*[243]

According to the managing owner, the SCANDIES ROSE was going to fish for one trip of cod in order to make a delivery of that fish and establish a catch history and then immediately switch to fishing for opilio crab. The reason given was because the main quota

[242] The invoice date for the work performed by Highmark Marine was November 22, 2019.
[243] Captain [redacted] MBI Hearing Transcript, Pg. 33

share owners wanted the SCANDIES ROSE to fish for that species as it is a higher priced catch.[244] The managing owner was well aware of the Captain's fishing plan which was to stay in an area not known to be optimal for Pacific cod but instead, off of Akutan Island on the southern opilio crabbing grounds where there was still good cod fishing. This had a two-fold purpose—so that Captain [redacted] could get his cod catch in and also assess whether they could stay low in the Bering Sea close to Akutan Island and Trident Seafood's base. The managing owner had agreed with Captain's [redacted] fishing plan and reasoning, stating that the company would prefer to fish on the east side of St. George Island towards Akutan and Unimak Islands because there were fewer vessels fishing that area as the fishing had not been as good in previous years. Captain [redacted] indicated that Captain [redacted] was prospecting and making a short cod trip and he was hoping to find opilio crab at the same time as the pots were down for cod so he could stay south in the Bering Sea rather than transit to the fishing grounds northwest of St. Paul Island, which would have cost both time and fuel and would have reduced the voyage profits.

This was an important factor in the decisions of Captain [redacted] as he was a part owner of the SCANDIES ROSE and, as mentioned earlier, was in the process of purchasing additional shares from the minority owner. In purchasing these shares, Captain [redacted] was taking on additional debt but was also going to be able to have more say in decisions and collect more of the potential payoff from profit earned from fishing operations. On December 19, 2019 the Captain and Mr. [redacted] began negotiating for the purchase of his share of the vessel. The minority owner who was selling the shares testified that he received a call from Captain [redacted] on December 30, 2019, to finalize the sale of his share and that Captain [redacted] was "excited" and "he wanted to buy the shares for the boat for he and his son."[245]

The recent increase in the financial investment in the SCANDIES ROSE would have added additional pressure on and motivation for Captain [redacted] to get out on the fishing grounds to actively fish in the short available window to catch cod. At that point, every dollar earned meant something, because it meant he could pay off the debt and put more money into his investment. Captain [redacted] had a prearranged agreement with the majority owner, Captain [redacted] to make at least one cod delivery at the start of 2020 to establish a catch history on a fishery that did not historically make a significant profit. Captain [redacted] would have felt even more pressure to get this fishery over with so he could get to the more fiscally attractive opilio crab fishery.

5.8.2. Fatigue

The effects of physiologic fatigue on human performance and alertness are well documented. The IMO, which governs the majority of international maritime shipping, makes the following statement describing fatigue:

> *A state of physical and/or mental impairment resulting from factors such as inadequate sleep, extended wakefulness, work/rest requirements out of sync with circadian rhythms*

[244] Captain [redacted] MBI Hearing Transcript, Pg. 100
[245] Mr. [redacted] MBI Hearing Transcript, Pg. 165

and physical, mental or emotional exertion that can impair alertness and the ability to safely operate a ship or perform safety-related duties.[246]

Furthermore, the IMO states:

Fatigue is a hazard because it may affect a seafarer's ability to do their job effectively and safely. Importantly, fatigue affects everyone regardless of skill, knowledge and training. The effects of fatigue can be particularly dangerous in the transportation sector, including the shipping industry. All stakeholders should be alert to the factors which may contribute to fatigue, and make efforts to mitigate and manage the risks posed by fatigue.[247]

The operation of the fishing vessel SCANDIES ROSE and other commercial marine vessels is similar in nature in terms of maneuvering, navigation, and basic seamanship. Similarly, fatigue impacts mariners on any vessel in the same manner. Life on a vessel such as the SCANDIES ROSE includes stress, exposure to extreme environmental conditions, strenuous manual labor, irregular eating and hydration habits, and other factors. These all contribute to overall fatigue and set the baseline for the recovery periods necessary to operate vessels safely. Sleep and resting is the essential physiologic process that counteract fatigue for personnel. At present, there are no work/rest regulations applicable to CFVs less than 200 GTs to reduce the risks posed by fatigued crews and, more importantly, prevent the degradation of critical decisions made by the crews.

A fatigue analysis was conducted in support of this investigation using a Fatigue Avoidance Scheduling Tool (FAST). The analysis examined sleep/wake (also referred to as work/rest) schedules provided by survivors, and interpreted for the Captain, in order to determine whether the basic physiologic elements (sleep duration, stability, sustained wakefulness, and time-of-day) were within appropriate tolerance limits on the accident voyage. It would be assumed that the rest of the crew that loaded the SCANDIES ROSE for the voyage would have had a similar impact from fatigue. The analysis for Mr. [redacted] one of the two survivors, demonstrated the mounting effects of long work periods and short sleep as the crew prepared to get underway for the accident voyage.

[246] IMO MSC.1/Circ.1598 24 January 2019 – Guidelines on Fatigue, Pg. 1
[247] IMO MSC.1/Circ.1598 24 January 2019 – Guidelines on Fatigue, Pg. 1

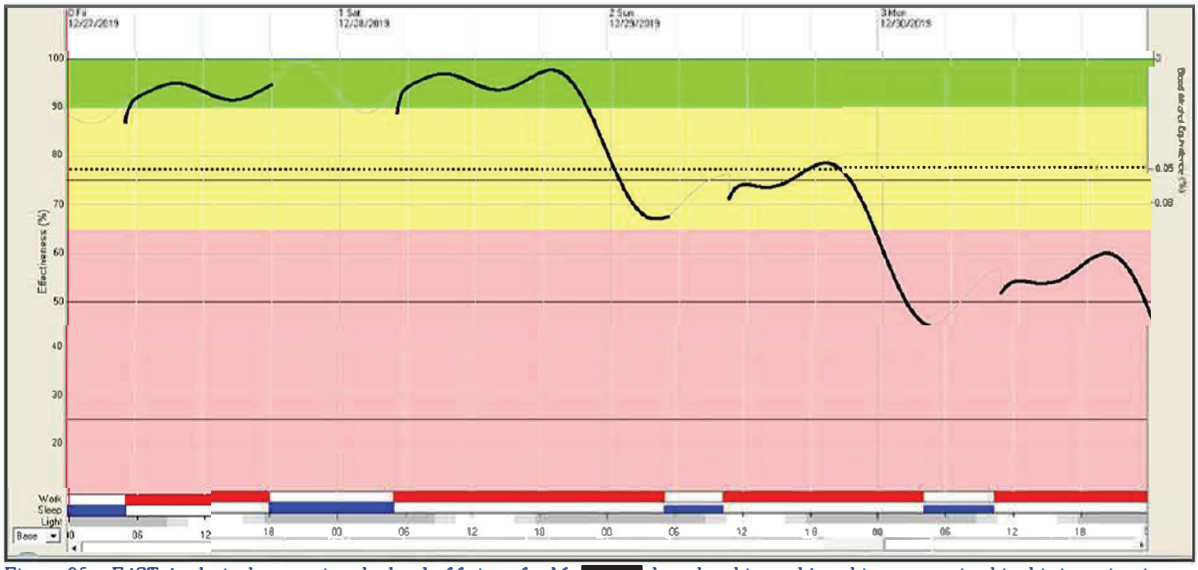


Figure 95 – FAST Analysis documenting the level of fatigue for Mr. [redacted] based on his work/rest history examined in this investigation. (Source Coast Guard)

The analysis, conducted by the Coast Guard's Office of Safety and Environmental Health, assumed good "effectiveness" level on day 1 as there was no previous data to consider. Even in the best case scenario, by the end of day 2, the member's effectiveness decreased as the sleep period was short and taken in periods of the day when the biological clock was not prepared for sleep. The analysis indicated that, at this point, an expected consequence on alertness and performance is comparable to someone under the influence of alcohol—at this level of 'effectiveness' this crewmember "would be expected to perform as well as someone with a blood alcohol equivalence of .05" as noted in figure 95, above.[248] Once the vessel got underway and was in transit to the fishing grounds, the analysis recognized that the member had more of an opportunity to get more rest, but some of those hours were not during hours when the body is used to sleeping so the sleep was not considered restorative. The analysis concluded that "any member who experienced a work schedule similar to Mr. [redacted] probably all the crew who participated in the preparation of the boat, would have experienced similar alertness and performance consequences."[249]

A FAST analysis for Captain [redacted] used second-hand information provided by survivors and witnesses who engaged Captain [redacted] prior to and during the voyage accident. Figure 96 shows the anticipated "effectiveness" levels for the vessel Captain assuming he had a more normal work day when in port but then stood six hours of watch and six hours off watch when the vessel was underway. This model was developed for a seven-day period to show the downward trend of effectiveness over time. This "six on/six off" schedule is common practice in commercial maritime world of work. However, that schedule is recognized to contribute to sleep debt since the longest main sleep period is approximately 5.5 hours. This is because while two sleep periods are possible over a 24-hour period, neither is long enough to accommodate 'full' sleep restoration.

[248] Coast Guard's Office of Safety and Environmental Health Fatigue Analysis SCANDIES ROSE, CG Exhibit 139
[249] Coast Guard's Office of Safety and Environmental Health Fatigue Analysis SCANDIES ROSE, CG Exhibit 139

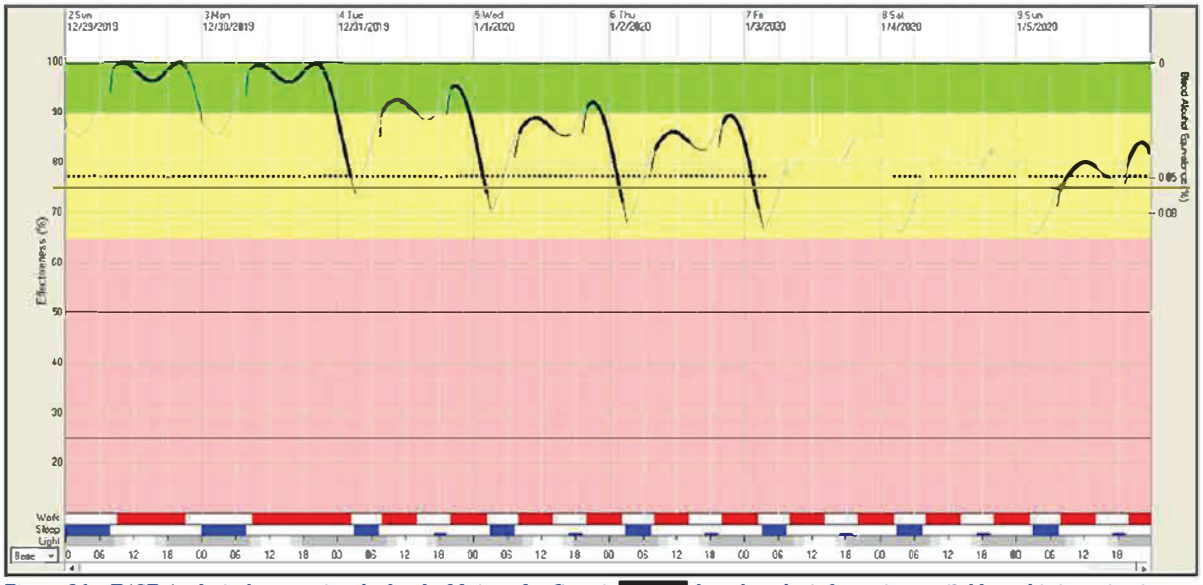


Figure 96 – FAST Analysis documenting the level of fatigue for Captain [redacted] based on the information available to this investigation. (Source Coast Guard)

The result of the effects of fatigue cannot be precisely determined but may have resulted in an impairment of the critical decision-making during the voyage transit for both the Captain and crewmembers during worsening weather and may have contributed to the failure to seek timely safe refuge before the vessel experienced a catastrophic loss of stability. It may also have contributed to the failure to recognize the dangerous conditions developing such as ice accumulation on the pot stack or other potential sources of list and their resulting consequence on the vessel—the decrease in stability. This delay in identification of the danger to the vessel and lack of further action to mitigate the loss of stability put the vessel and her crew further in extremis.

5.8.3. Failure to Identify and Mitigate Ice Accumulation

The exact amount of ice the SCANDIES ROSE crew observed during the accident voyage transit is unknown, but evidence indicates the vessel most likely accumulated excessive ice from freezing spray conditions. Modeling done by the NTSB produced estimates with an accumulation of ice between 6 to 15 inches on the vessel and associated crab pots at a rate of up to 1.6 inches per hour during the heaviest periods. The crew failed to associate the accumulating ice and the risks it posed to the vessel's stability in the later stages of the vessel's voyage. If there were other sources for the increasing starboard list, the crew did not investigate and identify those potential sources.

The goal of getting to the cod fishing grounds potentially caused Captain [redacted] to experience "fixation" in his role of operating the vessel. Fixation is a human factor where an individual is focusing all their conscience attention on a limited number of factors to the exclusion of all others. Once the decision was made to depart regardless of the dangerous forecasted weather, they maintained course and speed into steadily worsening conditions, bypassing a number of safe and protected areas where the vessel could have sheltered. Survivors did not recount discussions with the Captain about the possibility of sheltering,

slowing, or changing course to avoid icing, but the decision was made to maintain course until the turn to the lee of Sutwik Island.

The Captain and crew were fixated on getting to the cod grounds, relying on their previous experiences, expectations, and confidence in each other without real-time assessment of onboard conditions. The crew relied heavily on the Captain's experience and trusted his decisions. Likewise, the Captain trusted the crew with operating the vessel regardless of his previous experience with them. Without watchstanding instructions or specific guidance to the crew on when to alert the Captain, the crew was left to their own judgement. Any one of them could have noted the deterioration of conditions or the beginning of icing during their watch and notified the Captain. The Captain could then have immediately assessed the situation and taken action to ensure the safety of the vessel and crew, including mitigation of icing. When the Captain took his final watch, he was immediately faced with dealing with a vessel that had a sustained list to starboard from an unidentified source, with freezing spray coming onto the starboard side and gale force winds on the starboard bow.

At no point during the transit did Captain [redacted] have the crew manually break ice off the pot stack in an effort to manage the vessel's stability.

Based on testimony, there was minimal ice build-up on the pot stack with estimates given of a maximum thickness of ice of 2 inches. From the vantage point of the wheelhouse windows on the starboard side of the vessel, the viewer forward would only be slightly higher than the forward top of the pot stack. During the subsequent ice accretion testing conducted at the U.S. Army Corps of Engineers testing facility in Hanover, NH on behalf of the Coast Guard RDC, it was difficult to measure the thickness of ice on a crab pot because the icing removes the frame of reference, the solid steel frame of the crab pot. Figure 97, below, illustrate the difficulty of accurately identifying the thickness of ice on a crab pot in the testing chamber. On board the SCANDIES ROSE, from the wheelhouse to the forward end of the pot stack was a distance of approximately 50 to 65 ft and it would be difficult to determine the thickness of the accumulated ice once a white sheet of ice began to cover the pots.

*Figure 97 – These images demonstrate the difficulty in determining the thickness of ice in crab pots being subjected to freezing spray in a -15° F chamber during the ice accretion testing in September 2021. **Left**, a three pot stack with a significant accumulation of ice. Right, a ruler that is used to accurately measure the thickness of ice that uses the bottom of the three foot high crab pot as a point of reference to measure the thickness of the ice accurately. (Source Coast Guard)*

Captain [redacted] had a number of potential opportunities to mitigate the risk of ice accumulation as a source of negative stability throughout the accident voyage. Despite numerous weather warnings, the unexplained list, observed heavier weather, and crew suggestions, he did not take action to mitigate ice accumulation.

Pressing onwards with the voyage in the early evening, the time for action to reduce this ice accumulation became increasingly limited as the vessel's list continued to increase to starboard. The options of reducing the list caused by icing or other potential sources were limited. Changing course, slowing earlier in the voyage or seeking shelter from the elements, or identifying and mitigating any other source of the list other than icing were becoming no longer viable options at this point in the transit. Captain [redacted] did not appropriately recognize the risk posed by the accumulating ice, acting wind forces on his vessel, and resulting loss of stability of the vessel and continued to make phone calls to friends. During this time, the list to starboard continued to grow. It was not until hours later that Captain [redacted] recognized the potential risk to his vessel as exemplified by the phone call made to the PACIFIC SOUNDER at approximately 9:15 p.m. Even at that point, when the vessel was experiencing a 20-degree list to starboard, he did not fully recognize the seriousness of the situation, declaring an emergency on the vessel and calling out the crew to prepare for immediate action, including the worst case to abandon the vessel. The Captain of the PACIFIC SOUNDER recalled that conversation, stating

> *And then we got into talking about Sutwik Island there and the bay. He was heading for the south side there. He was somewhere near the island. But then we discussed a bunch of other things, too, Christmas and fishing,…he estimated he'd probably be two-and-a-half days late because he had to get, get up behind the island and break ice and needed to get up behind and the wind was going 60, 70 knots, 20 degrees. And he was making his way up there, but -- so that's -- so that – we were discussing that. And he also told me that he had 195 pots on and had just recently done a new stability report on the vessel. And then we chatted about some other stuff. There was no urgency in the call at that time. And talking about him, he had just bought some more shares in the vessel and talked about the upcoming cod season and where I was fishing and, you know, things like that.*[250]

Captain [redacted] failed to determine the exact cause of the worsening vessel list. The evidence points to the ice buildup as a contributing factor to the vessel's starboard list. The off-going watchstander testified that he did not do a round of the engine room so he could not confirm the material condition of that space at approximately 7:15 p.m.. After Mr. [redacted] went below, he stated that he saw the engineer coming out of the engine room and assumed he was transferring fuel to correct the list but did not communicate with him to verify. As the Captain's last navigation watch commenced and starboard list increased, and Captain [redacted] focused on getting to the lee of Sutwik Island, he neglected to identify the cause of the list and to attempt to reduce the continued effects of the heavy freezing spray building on the vessel. At the time, the strong winds were acting on the vessel's starboard side, essentially

[250] Captain [redacted] MBI Hearing Transcript, Pg. 799

propping it up and counteracting the real list of the vessel caused by the building ice accumulation or other possible cause of list on the starboard side.

Not taking the opportunity to identify, navigate to, and anchor in a sheltered area, as other vessels did, earlier in the day to avoid anticipated deteriorating weather and heavy freezing spray and subsequent ice accumulation, placed the vessel in a considerably reduced stability condition that ultimately resulted in a catastrophic loss of stability.

It is unclear if taking action and manually removing the accumulated ice weight from the pot stack and superstructure of the SCANDIES ROSE at 7:15 p.m. would have stabilized the vessel's stability condition enough to keep it from capsizing on the accident night or if the situation was already too far in extremis at that point of the voyage. However, Captain [redacted] made an error in decision-making based on an inaccurate expectation that he could make it to the shelter of Sutwik Island. This human error, inaccurate expectation, is a factor when an individual expects to perceive a certain reality and those expectations are strong enough to create a false expectation of a certain reality. In this case, he expected that if he could just make it to the lee of Sutwik Island he would be better positioned to have his crew get out on deck and manually break ice off the pot stack. However, in making a starboard turn towards the lee of Sutwik Island without previously determining the cause of the list, Captain [redacted] put the 60-70 kt northwest winds on the SCANDIES ROSE's port side in the course of turning, which further exacerbated the starboard list and was most likely the catalyst for downflooding and sinking.

As the weather conditions and vessel stability deteriorated, he did not take timely action to reduce the ice load or discuss the last ditch option of removing some of the chains securing the crab pot stack and dump some of the pots over the side to reduce topside weight.

5.8.4. Misperception of Environmental Factors and Developing List

The Captain and crew misperceived environmental factors acting on the vessel when the strong winds on the starboard side counteracted the listing of the vessel to starboard. It should have been apparent to any of the crew that the source of the starboard list was not the wind and the listing was due to some other cause. The pronounced list that eventually developed late in the accident day began to occur gradually as the weight of the ice built on the forward starboard side of the vessel. The stability instructions to the master warned

> *Always determine the cause of any list before taking corrective action*[251]

In the case of the SCANDIES ROSE, it is most likely that the primary cause of the list was the accumulation of ice on the starboard, forward portion of the pot stack. However, it is possible that the accumulation of water and ice on the deck inside the vessel's bulwarks decreased the freeboard and seriously increased the list that led to a dangerous angle of heel that allowed downflooding into the engine room. It is also possible that there were other causes of the list which were not identified or addressed by the Captain or crew. Based on the

[251] CG Exhibit 036

MSC analysis of the SCANDIES ROSE, that angle for the loaded draft would be approximately 35 degrees.

In another major marine accident, the American steam ship EL FARO which was sunk in a hurricane in October 2015, the initial listing of the ship was not identified and acted on by the crew on watch. The crew persons on watch did not identify the slow building of a list up to approximately 4-degrees to starboard during the final stages of the accident voyage. It was only after a crew person not on watch came up on the bridge and mentioned the list of the ship, initially attributed as wind heel and a new mate, the Chief Mate came on watch that the sustained list and the potential danger of this list became apparent. Onboard the SCANDIES ROSE there does not appear to be a correlation between the reported two degrees of list and the weight of the icing, both on the starboard side by the last two watchstanders before the Captain took the final navigation watch. A discussion then took place about the icing but not about the cause of the list.

Ultimately, the failure to identify the source of the list led the Captain and crew to make decisions without complete information. In this case, simply sending someone to investigate all spaces on the vessel could have identified potential flooding sources that may have been mitigated without putting crew in danger from the outside elements.

5.8.5. Medical Conditions for the Accident Voyage Crew

In almost all cases, commercial mariners other than those operating fishing vessels less than 200 GT are required to have a detailed physical to enable them to hold a credential or license. This ensures the medical fitness of these individuals to ensure the safety of vessel operations on critical waterways of the United States and far at sea. The required physical is performed by a medical doctor and entails a thorough medical examination, detailed medical history and listing of all prescribed medications as well as over the counter medications and supplements. There can also be a testing of physical ability to perform the duties of the rating or license, such as using a fire hose, dragging a person, opening and passing through small openings like hatches and scuttles. The determination of medical fitness for most ratings other than First Class Pilots is at an interval of five years on renewal of the credential.

In the case of credentialed mariners, medical conditions that pose a risk to operations such as cardiac conditions, epilepsy, vision, hearing and other conditions are closely scrutinized and determinations are made if that mariner can safely work on a vessel and in those cases waivers and special conditions may be imposed. In the more serious cases of medical conditions a person would be denied a credential. As a more typical example, in the case of a mariner with poor eyesight and prescribed eyeglasses, the waiver that is printed in the credential may require the mariner to carry a second pair of those glasses when onboard a vessel. Prescribed medications that impair functioning are carefully scrutinized and a determination is made if that mariner can safely operate or serve on a vessel while under the effects of this medication. In the case where a medical certificate is required for a mariner, the Coast Guard will then issue or add the appropriate documentation to the mariner's credential after a full determination has been made of the individual's medical fitness to serve.

Neither the crew nor the captain of the SCANDIES ROSE were required to hold any mariner's credential and were, therefore, not required to undergo any medical vetting to ensure that they could safely operate onboard a vessel. The Captain of the SCANDIES ROSE reported that he had frequent difficulty sleeping on the self-certifying forms supplied by the vessel manager. He also had a host of other medical issues and on December 30, 2019, he went to a Kodiak based medical facility with a skin condition and was treated. Another crewmember listed a medical condition, diabetes, for which he was insulin dependent. The managing owner as well as the vessel manager, whose primary responsibility was to manage personnel records, were not aware of these medical conditions for the crew of the vessel, with the exception of the Captain's color-blindness. Despite the late arrival of the forms for the accident voyage, the company was not aware of significant medical conditions of several of the crewmembers based on medical forms previously submitted. It is not known if these crew medical evaluation forms and the accompanying medical release for further information forms were ever used as a proactive management tool for ensuring the safety of the SCANDIES ROSE operations. Without a determination of medical fitness for service by a medical professional, there is no way of determining if a listed medical condition, or use of over-the-counter medications or supplements, may have contributed to the accident.

Medical conditions that affect safety of operations and safety of the crew of commercial fishing vessels which operate far from shore in a historically dangerous marine environment are not presently evaluated by medical professionals working on behalf of marine employers for vessels similar to the SCANDIES ROSE. This creates a latent unsafe condition for an entire fleet of vessels, and while not a direct contributing cause to this accident, this is a "finding of concern."

5.8.6. Potential for Impairment of the Crew of the SCANDIES ROSE

The commercial fishing vessel industry is not broadly subjected to drug and alcohol testing as a preventative safety measure. By regulation, commercial fishing vessels over 200 GT require Coast Guard credentialed mariners in certain positions such as masters, mates, and chief engineers. Those vessels are required to have a drug and alcohol testing program in place for crewmembers.[252] The requirements for drug testing include pre-employment, random testing of the crew, post-casualty, and reasonable cause. For CFVs under 200 GT, there is no requirement for a marine employer to establish a drug/alcohol testing program. However, CFVs of this gross tonnage still have to meet post casualty drug and alcohol testing requirements as described by 46 CFR 4.06.

The Coast Guard has evaluated the use of substances that may alter or impair human performance, decision making, and judgment and formulated policies such as NVIC 04-08 (C-2 to Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials). The Coast Guard's posture on all substances that may impair cognitive abilities such as drugs, alcohol, or medications or the use of dangerous drugs is summed up in the quote from the NVIC

[252] Crewmembers as defined by 46 CFR 16.105

The nature of shipboard life and shipboard operations is such that mariners may be subject to unexpected or emergency response duties associated with vessel, crew, or passenger safety, prevention of pollution and maritime security at any time while aboard a vessel.[253]

In the case of the SCANDIES ROSE, there were no required Coast Guard credentialed personnel for the vessel nor were there any credentialed crew onboard at the time of the accident. Thus, the owner was not required to have a drug-testing program in place. However, the company did proactively require pre-employment drug testing. The Marine Board reviewed evidence attesting to the two new crewmember's pre-employment drug tests. One of the pre-employment tests was completed at a certified laboratory. The laboratory results documented clear indication of [redacted] first crewmember. The other crewmember was tested onboard using a home test kit. Based on testimony from the vessel manager and evidence submitted to the company in way of photos from the Captain over text message, the crewmembers' drug test reportedly indicated [redacted] for which were tested. However, the Marine Board was unable to confirm the test results using the photographic evidence or testimony provided.

The company did attempt to meet the post-casualty drug testing requirement to the best of their ability given the remote location and limited testing facilities. To meet the requirement, the company utilized home test kits that were administered at a private residence. Evidence shows that the same crewmember who was tested onboard for pre-employment, using similar home test kit, [redacted] post-accident. The post-accident tests were not DOT approved and were not conducted under laboratory conditions. Furthermore, the [redacted] was not validated as recommended by the manufacturer of the test kit.

Due to the results of the post-accident drug tests, the Marine Board cannot rule out the possibility that one of the crewmembers, who stood a navigational watch, may have been impaired during the accident voyage.

5.8.7. Lack of Established Vessel Procedures

The Marine Board could not locate any written procedures to be used on the vessel (formal or informal) specifically for the safety of operations. Some safety related procedures would include watchstanding, voyage planning, and others. A good example is a procedure for ensuring watertight integrity was maintained which was also part of the stability instructions to the master, created in 2019. Some examples on the accident voyage would include creating an alleyway in the pot stack to access the bow, closure of watertight doors or hatches such as the hatches to the pipe alley voids that run alongside the holds, and donning of immersion suits by entire crew during the pre-departure training. There is no evidence that there were established procedures for ensuring the watertight integrity of the vessel.

During the accident voyage, at least one hatch, the after one into the starboard pipe void, was reported to have been left open while the SCANDIES ROSE was underway. However, the hatch should have been normally closed to maintain watertight integrity for such a large

[253] Coast Guard NVIC 04-08 (CH-2), dated April 25, 2016, Pg. 73

space in the interior of the vessel and to remain in compliance with the stability instructions for the master dated May 29, 2019.

> *The master, of the vessel is responsible for maintaining watertight integrity at all times and to exercise prudent seamanship, giving consideration to the season of the year, weather, sea and ice conditions.*[254]

5.8.8. Verification of Crew Competency

Within the [redacted] Management/Scandies Rose Fishing Company LLC organization, the identification and hiring of crew persons was almost exclusively done by the Captain in this case for the accident voyage. In testimony, the managing owner stated that while he did have "ultimate veto power," hiring of crew was "really up to the captain."[255] The vessel manager plays a role in the pre-hiring administration, though that responsibility was shared with the Captain and the details on who does what is not clearly defined in any written procedure. In testimony, the vessel manager further explained about hiring

> *I do some vetting and he does some vetting. And usually it's he calls me and says hey, [redacted] -- I want to hire [redacted] get him hired. And if he hires them off the dock, then he'll do all the paperwork and send it to me.*[256]

This shared roles and responsibilities for hiring of crewmembers extended to processes like pre-employment drug testing, which in the case of non-Coast Guard credentialed mariners was a proactive policy of Scandies Rose Fishing Company LLC. If a new potential crewmember was hired in advance of a fishing trip and there was enough time, the vessel manager will send them to a certified drug testing location if one was available. However, if this was a last minute hire or the drug testing facility was not available such as in a remote location in Alaska, the company would and did utilize over the counter home drug testing kits to meet the company requirement for pre-season drug testing.

Leading up to the accident voyage, there was significant discretion given to the SCANDIES ROSE Captain in his selection of the crew. Two new hires got on board and they did not receive familiarization for onboard systems including the vessel's navigation equipment. From the time these new crew members were hired to the time of the accident, there were few interactions between the survivors and the Captain. One survivor testified

> *I didn't really have too many interactions. I mean, it was -- I could count on one hand the amount of times I was actually in the same vicinity speaking around or at -- or with him.*[257]

[254] CG Exhibit 036
[255] Captain [redacted] MBI Hearing Transcript, Pg. 40
[256] Ms. [redacted] MBI Hearing Transcript, Pg. 124
[257] Mr. [redacted] CG Exhibit 136, Post MBI Interview, Pg. 13

Despite having never sailed with them before, Captain [redacted] assumed that the new crewmembers had the knowledge to stand the navigation watches and utilize all the navigation related equipment in the wheelhouse. Mr. [redacted] testified

> *Q. ... so would you say that approach, was that any different than any other experiences you've had on a fishing vessel or is it kind of a similar attitude towards the weather? A. No. If I put it this way, you know, I've had people ask me, why didn't you say something, like, you know, suggest that maybe we shouldn't leave, you know? And I, I always laugh about that. I'm like, that's not what you're hired for. You're hired as, you know, like I said, from the neck down. And you get that reputation as being that guy that didn't have, you know, the, the balls, if you will, I guess, to go. That sticks with you, and good luck getting a job on another boat. So no one's, no one's ever brought that up. You don't, you don't do that.*[258]

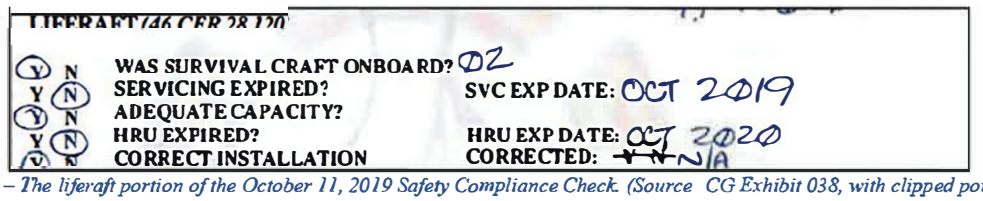
Standing a navigation watch while underway with the crew below and asleep is an essential operational and safety related duty. It requires familiarization and a level of understanding of the Captain's expectations before assuming such duties.

The other crew had served with the Captain and on the vessel and there was a presumption that they knew what the expectations were for standing the navigation watches based on the time they served aboard and the familiarity with the vessel and its equipment. Due to the pressure of getting underway to the fishing grounds late, Captain [redacted] did not ensure that the two newest crewmembers had enough understanding of the vessel itself, the equipment, or the potential impact of the hazardous weather and icing that might affect the SCANDIES ROSE. Neither survivor testified that the Captain assessed their competency to stand a navigation watch.

5.9. Adequacy of Lifesaving and Relevant Safety Equipment

5.9.1. Stowage and Access to Survival Rafts

The SCANDIES ROSE received a Safety Compliance Check conducted by the Coast Guard on October 11, 2019. The examiners used the Sector Anchorage Safety and Compliance Check form. A portion of that form is shown in figure 98, below:


LIFERAFT (46 CFR 28.120)

(Y)	N	WAS SURVIVAL CRAFT ONBOARD? 02	
Y	(N)	SERVICING EXPIRED?	SVC EXP DATE: OCT 2019
(Y)	N	ADEQUATE CAPACITY?	
Y	(N)	HRU EXPIRED?	HRU EXP DATE: OCT 2020
(Y)	N	CORRECT INSTALLATION	CORRECTED: ~~Y~~ N N/A

Figure 98 – The liferaft portion of the October 11, 2019 Safety Compliance Check. (Source CG Exhibit 038, with clipped portion displayed)

The form directs the inspector to check the liferafts and their launching apparatus. The SCANDIES ROSE carried two eight-person liferafts, which was double the required number of rafts and was a proactive decision by the vessel operators or owners. During the safety

[258] Mr. [redacted] MBI Hearing Transcript, Pg. 549

compliance check, it was noted that the liferafts were compliant, but one of them would be due for servicing soon and arrangements were later made to have that raft serviced. That raft was serviced and ready for shipment December 1, 2019. Both rafts were compliant for the accident voyage. The Hydrostatic Release Unit (HRU) was not expired, and the rafts were installed correctly.

The successful deployment of both of the rafts during the sinking event was attributed to the proper servicing and mounting of the rafts on top of the wheelhouse of the SCANDIES ROSE. In mounting these self-deploying rafts, it is critical to ensure that the raft painter[259] is affixed according to specifications so the weak link will break and release the raft, as designed, as the vessel sinks. Failure to properly install and configure the associated releasing gear could result in the inflated raft being drawn downward with the sinking vessel and potentially being rendered useless by improper mounting in the storage bracket. In testimony, Mr. [redacted] the liferaft technician, made the following statement with regards to the criticality of properly tying the painter to the vessel

> *We try to show them, but they hook up that liferaft to that hydrostatic, that vessel goes down, and it's 2 o'clock -- those vessels happen to go down very, very quickly, and it's never on a nice day, you know, 8 o'clock, you know, 6 o'clock in the afternoon; they've got time. It's usually very dark, extreme weather, they have to act very quickly. And if they secure that painter line to the vessel, and that vessel goes down, that liferaft will go down with that vessel. So knowing where to -- how to cut -- your knife, cut yourself free, that's a major, that's a major thing that they have to know.*[260]

Both of the two eight-person canopied liferafts deployed properly and floated to the surface following the capsizing and sinking of the SCANDIES ROSE. Once at the surface, they were ready for boarding with a sea anchor deployed and the water bag stabilization below the raft bottom keeping them upright with the exterior canopy flashing light marking their locations. Fortunately, after the sinking, the rafts and the survivors drifted to a point in relative close proximity to each other allowing both survivors to board the same raft using the attached boarding platform to assist the survivors getting into the raft. The other raft was found empty by the helicopter when it arrived on scene. Based on the evidence and the witness statements, it is believed that the SCANDIES ROSE was in compliance with regulatory requirements regarding the Stowage and Access of the Lifesaving Equipment outlined in 46 CFR Part 28.

5.9.2. Survivor Raft Canopy Light Failure

One survivor recalled that at first the liferaft he was in was illuminated by an interior light and that about ten minutes after boarding the raft the light went out. Both liferafts were serviced at a servicing facility in compliance with the regulations for maintaining and inspecting the rafts. Certification was issued attesting to the servicing of the rafts. It is unclear why the light failed in the 30 ft seas and high winds, but the raft was subject to extreme external forces when the vessel sank. The Coast Guard pilot that testified in the hearing stated that the unoccupied raft was located by its canopy flashing light. Once in the raft, the survivors could open the survival equipment pack which had a D-cell waterproof

[259] A "painter" is a towing or tie-up line for a small boat.
[260] Mr. [redacted] MBI Hearing Transcript, Pg. 1172

flashlight and spare bulb and batteries. This flashlight was used by the survivors to locate emergency supplies and then to signal, with a side-to-side motion, the searching rescue helicopter.

5.9.3. Use, Stowage, and Access to Survival Raft Equipment

Both survivors expressed concerns regarding the difficulty of accessing the survival equipment package and its contents located by the canopy door into the raft. The liferaft was half full of seawater, the night was dark, and the environmental conditions severe. With the force of the sea and wind trying to overturn the raft, some of the objects in the bag sank to the bottom of the raft and some items floated, making it hard for the survivors to get what they needed.

Figure 99 – Image showing the raft equipment bag, indicated by the yellow arrow that is lashed to the floor of the raft near the boarding area. On the left side of the figure there is an example of a D-cell flashlight stored in an equipment bag. (Source Marine Safety Services, Inc.)

One of the survivors suggested using light emitting diode (LED) type lighting for the supplied lighting devices to ensure a greater reliability of the lights and more illumination in the raft which could increase the potential for detection by rescuers. LED lights generally use less electrical power and are more robust than incandescent bulbs.

The survival raft had six hand flares, four parachute rocket flares and two floating smoke signals. Mr. [redacted] testified that he had significant problems working the rocket flares with his immersion suit gloves on. In general, he stated that it was next to impossible to use almost anything in the survival kit with the immersion suit on. To remove a part of the immersion suit to give a wearer more dexterity with their hands would have defeated the

protective and insulating properties of the immersion suit. Mr. [redacted] testified that he was eventually able to fire off the rocket parachute flares despite the difficulty.

5.9.4. Contents of Survival Equipment Package

According to the most recent Coast Guard dockside examination and vessel liferaft records, the SCANDIES ROSE's route consisted of Coastal Waters, traveling 100 NM beyond the boundary line with a seven-person crew. This required the vessel to be equipped with at least one SOLAS A eight-person liferaft. Each liferaft maintains a "SOLAS A" equipment pack. The vessel was equipped with two SOLAS A 8-person liferafts.

The survival equipment pack is contained inside the folded liferaft near the canopy entrance and once the liferaft is inflated, can be accessed by the survivors. The survival pack is intended to help the occupants survive for a short duration of time prior to rescue and is not intended for survivors to experience a long duration at sea. Standard SOLAS A equipment contents include:

Life Raft Equipment in SOLAS A Raft **Scandies Rose was equipped with this type of raft and equipment** NOTE :Items in **BOLD** are mentioned in testimony			
Sea Anchor(Automatically Deployed)	Floating/Heaving Line (Length 100 ft.)	Rain Water Collector	Floating Knife
Waterproof Equipment Bag	Raft Use Instructions	Individual Thermal Protective Aids (2 ea.)	Paddles
Manual Inflation/Bilge Pump	Repair Clamps (6 ea.)	Adhesive & Patch Repair Kit	Sponges (2 ea.)
Graduated Drinking Cup	Fishing Kit	Can Opener	Seasick Bags (1 Per Person)
Water Storage Bag	Thermal Protective Aid	Signal Mirror	First Aid Kit
Signaling Whistle	Anti-Seasickness Pills (6 Per Person)	Spare Sea Anchor	Food Ration (10 Kilo-Joules Per Person)
Drinking Water (6-20 Person Capacity – 1½ Liters Per Person)	Bailer	Spare Flashlight "D" Cell Batteries (3 ea.)	Spare Flashlight Bulb
SOLAS Parachute Distress Signals (4 total)	**SOLAS Red Handheld Distress Signals (6 total))**	**SOLAS Smoke Signal (2 total)**	**Waterproof Flashlight**

Figure 100– Table discussing the requirements for a SOLAS A pack as found in the SCANDIES ROSE liferafts. (Source Coast Guard)

Many of the current requirements for survival craft equipment were developed in the 1950s and 1960s and have not been significantly updated since they were published. There have been significant improvements in survival products, including personal locator beacons (PLBs) or transponders for the rafts, which would greatly improve the odds of detection and survival.

There is a current proposed rule (USCG-2020-0107-0001), addressing changes needed for survival craft equipment changes. The rule primarily focuses on small passenger vessels inspected under CFR Subchapters T and K, but the current proposed rule also addresses the contents of SOLAS A equipment packs. The proposed rule highlights the fact that the specifications for the survival craft packs are outdated to the point where they are more cumbersome for manufacturers than they are beneficial. As such, the proposed rule will deregulate the type approval (specifically Coast Guard approval) of inflation/bilge pumps, compasses, first-aid kits, fishing kits, hatchets, knives (including jackknives), mirrors, sea anchors, and emergency drinking water. The new regulation would align some of these items with standards found in International Life Saving-Appliance (LSA) Code[261] by incorporating by reference applicable International Organization for Standardization (ISO) standards. If the manufacturer can meet those applicable ISO standards for the product, they would be able to use them in the liferaft. The traditional Coast Guard type approval would no longer be listed in the regulations for certain items listed as equipment in the rafts and this process might result in improvements in survival equipment design.

5.9.5. Visual Signaling Devices

Shortly after entering the raft and gaining access to the survival equipment storage bag, the survivors fired off three and then a fourth rocket flare with parachute. They struggled in the dark, waist deep water to find one of the flares that sank to the bottom of the raft floor. The Survivors recounted that they did not see or hear any nearby vessel when they fired the flares; and with that, they had used all of the most powerful night distress flares. The survival equipment bag also had six hand-held red flares that they could have used to attract attention but in their testimony they did not seem to be aware of these additional flares that they could have used.

Approximately four hours after boarding the raft, the survivors saw a bright white light in the vicinity of the other unoccupied raft, a distance away. Initially, the survivors thought this was the masthead light of a ship and they began to wave the battery-operated flashlight from side to side to attract the potential rescuer's attention. The crew of the Coast Guard rescue helicopter had determined that the other raft was empty and the co-pilot spotted the unmistakable side-to-side motion of the light that the survivors were waving. This signal stood out as one being made by people. An object with a fixed light in the 30 ft seas would have risen and fallen and not indicated survivors signaling to attract the attention of the rescuers.

5.9.6. Immersion Suits

The immersion suits on the SCANDIES ROSE were equipped with a whistle, strobe light, reflective material, and an inflatable high rider ring to provide increased buoyancy for the wearer's upper body. The suits were stored in a cabinet in the wheelhouse and there were also two suits located in the Captain's cabin as stated in the Condition and Valuation Survey dated 2019. The SCANDIES ROSE was equipped with six adult universal, three jumbo, and

[261] The International Life-Saving Appliance (LSA) Code is an IMO publication dealing with the manufacturing, testing, maintenance and record keeping of life-saving appliances.

one intermediate immersion suits. The extra-large "jumbo" immersion suits were stored in a green bag while the other suits were in orange bags.

Prior to leaving Kodiak, the crew had participated in the required drills and one person was instructed to put on an immersion suit. As the new crewmember onboard, Mr. [redacted] was directed to demonstrate the proper donning of a survival suit while the rest of the crew observed. There is ambiguity in the guidance and regulations when discussing pre-departure drills revolving around the "donning" of immersion suits. In the case of the SCANDIES ROSE, only one crewmember practiced donning the immersion suit and it is not known when the last time other crewmembers actually donned an immersion suit.

Figure 101 - Composite of photos of one of the survivor's actual survival or immersion suit. The yellow arrow indicates the manual inflation tube for inflating the bladder to assist upright floatation. Mr. [redacted] is wearing the suit in this demonstration. (Source CG Exhibit 103 composite with mark ups)

The proper donning of an immersion suit takes time and training to ensure that the suit is put on quickly and properly to ensure survival in an emergency. When a vessel is listing severely or sinking, there may not be ample time for the crew to assemble, understand the nature of the emergency, put on the immersion suit, and then, with restricted motion, move to a point where they can abandon the sinking vessel. This was the case on the SCANDIES ROSE, when the vessel suddenly lurched to starboard at twenty degrees without warning. The crew was left to put on the suits while struggling to find any horizontal surface or means of supporting themselves, like wedging themselves against a fixed bridge chair. Once in the suits, they would have to climb up a sloping deck and escape the wheelhouse.

Based on the testimony of the survivors, each of the survivors properly donned the correct size immersion suit and ensured that they were properly closed up to prevent hypothermia as per instructions. The purpose of a survival suit is to protect the wearer and insulate that person from dangerous cold-water immersion while affording floatation. To assist with the flotation there is an air bladder in the upper torso area of the suit that would be manually inflated after the person entered the water. This puts the wearer in a more upright position and provides additional buoyancy. The suits are made of neoprene and fully encapsulate the wearer except for portions of the face to protect the wearer from the effects of hypothermia.

The survivors noted that manual dexterity was limited while wearing the suit. The ability to use a person's hand to open items in the equipment bag and grasp objects is severely

compromised, as the suits have a three-finger mitten style hand covering which is permanently connected to the arm structure of the suit. The tradeoff between dexterity and hypothermia protection is a design challenge and these suits conform to existing regulations in terms of design and construction. However, the survivors were able to get to the inventory of the equipment pack, launch flares, and signal the rescue helicopter with a flashlight. It appears they successfully completed these tasks despite the difficulty with manual dexterity and the immersion suits functioned as intended protecting them from moderate to severe hypothermia.

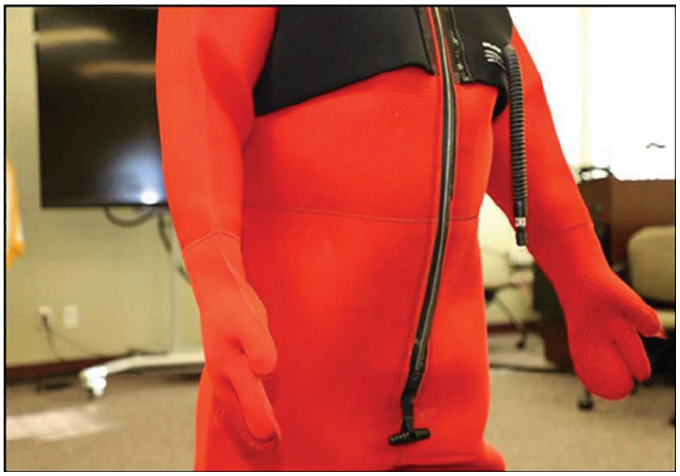


Figure 102 – SCANDIES ROSE survival or immersion suit showing the three-finger glove which is attached to the neoprene arm of the suit. The three-finger glove protects the hand from hypothermia but compromises manual dexterity for tasks like opening buckles or activating flares. (Source CG Exhibit 103)

The proper sizing, donning, and wearing of the survival suits ensured the survival of the two survivors after being in a water-filled liferaft with 10° Fahrenheit air temperature and 38° Fahrenheit seawater temperature for four hours and then the flight back to Kodiak in an unheated helicopter cabin. They were treated at a local hospital for mild hypothermia and released without being admitted. Mr. [redacted] properly demonstrated donning his immersion suit post-accident for the Sector Anchorage Investigation division and again in the presence of the Marine Board. Mr. [redacted] also properly donned his immersion suit in the presence of an investigating officer in Kodiak, AK. These were both the same immersion suits that they used the night the SCANDIES ROSE sank. In demonstrating the wear of these suits and examining the suits, the Marine Board was able to confirm that the suits were both in good condition, and appropriately sized for each of the survivors.

5.9.7. Emergency Position Indicating Radio Beacon (EPIRB)

Based on the safety compliance check and other evidence, the SCANDIES ROSE had an EPIRB aboard that was compliant with regulations. The vessel managers did successfully submit the application to NOAA to register their EPIRB, complete with the required information, and the EPIRB data was maintained in the NOAA database. This data included shore side telephone and email contacts and other critical information for the SCANDIES ROSE to assist rescue forces.

The SCANDIES ROSE EPIRB was not located. It was not located on the surface of the water or in the underwater ROV survey. The February 2020 ROV survey discovered the EPIRB storage bracket empty with no sign of the EPIRB or its painter or lanyard. Examining the ROV photos did not provide any conclusive evidence to suggest what happened to the EPIRB during the accident.

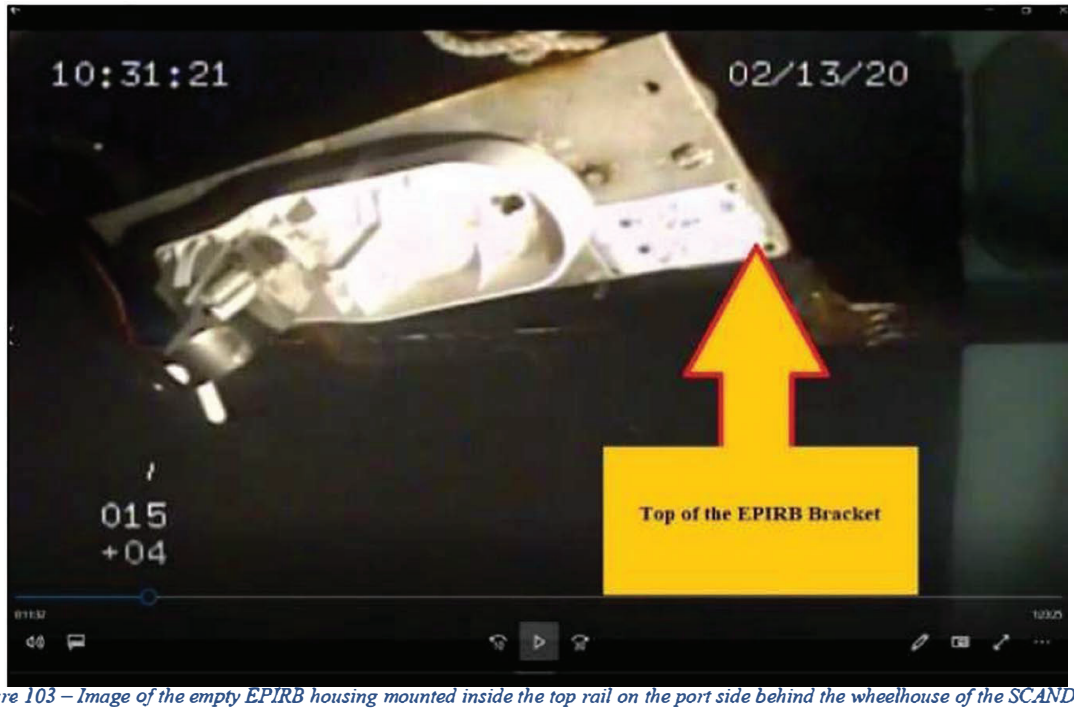


Figure 103 – Image of the empty EPIRB housing mounted inside the top rail on the port side behind the wheelhouse of the SCANDIES ROSE taken during the ROV underwater survey mission and photographed at the angle the EPIRB bracket was found on the seafloor. (Source CG Exhibit 008)

The EPIRB on the SCANDIES ROSE was stored in a plastic housing attached to the handrail behind the wheelhouse on the port side. The EPIRB would have activated in either of two ways: (1) when it was released automatically using the installed hydrostatic release unit when the vessel sank, or (2) manually activated by the crew by removing the EPIRB from the bracket and pressing a button to activate. In either method, once activated, the EPIRB would establish a link with the satellite and transmit a distress signal to shore that would indicate the distressed vessel's name and geographic location as well as other information.

The two survivors indicated in their testimony that the Captain of the SCANDIES ROSE may have tested the EPIRB prior to getting underway although their testimony as to the extent or success of the test is unclear. The EPIRB device has a self-test function and when that self-test is initiated there are LED lights which alert the tester that the unit is functioning correctly. Also, when a device like this one is tested it sends the test to a satellite and then to shore where that self-test can be noted in computer data records, such as those maintained by NOAA. There is no evidence that this self-test was done immediately prior to departure. One witness mentioned that the Captain was worried that he accidentally sent a distress signal during the testing during some earlier time.

The lead Coast Guard safety inspector for the SCANDIES ROSE's Safety Compliance Check in October stated that he saw the EPIRB and the hydrostatic release for that device were within expiration date.

On the night of the accident, the EPIRB did not transmit a distress signal for the SCANDIES ROSE. Witnesses speculated that the Captain of the SCANDIES ROSE or one of her crew may have brought the EPIRB into the wheelhouse as they prepared the crew for abandoning the vessel. If the EPIRB was in the wheelhouse at the time of the sinking, it would have been activated by immersion in the surrounding seawater, but it would not have had the clear line of sight from the antenna that it needs for the electronic distress signal to reach a satellite. Based on testimony that indicated that the SCANDIES ROSE sank rapidly on its starboard side and then finally bow up, a plausible explanation as to why there was no EPIRB distress signal received would be that the EPIRB was entrapped in the wheelhouse or was caught up in the vessel debris as it sank.

5.9.8. Personal Locator Beacons (PLB)

Several high profile distress cases of recent years have highlighted the use of PLBs as a means to rapidly locate people in distress in the marine environment. Both, the Coast Guard and the National Transportation Safety Board have advocated for the use of the devices in recent high profile accident safety recommendations. Currently, these devices are not a mandatory safety item for any commercial or recreational vessels. As far as the investigation can determine, no member of the SCANDIES ROSE crew owned a PLB as part of their personal safety equipment, nor were any issued by the operator of the SCANDIES ROSE for crew use.

PLBs are small, lightweight, portable homing beacons that operate like a simpler version of an EPIRB. PLBs are designed to be worn by a person, affixed to a person's immersion suit, life jacket, or work vest, and are registered through the FCC to an individual. A PLB is activated manually by the user in an emergency and operates in a similar fashion to the EPIRB with an emergency signal being sent via satellite and it sends a homing beacon signal on 121.5 MHz. That homing signal would be received aboard ships or aircraft which would then create a line of position using the homing signal leading to the person in distress. Some newer model PLBs also contain an internal GPS chip, which can pinpoint the PLB and the person needing assistance to within approximately 100 meters. PLBs can expedite the time and effectiveness of rescue. The average cost of a PLB is in the range of approximately $350.

Figure 104 – On the left, is an ACR Electronics Inc. version of a PLB that could have been carried by the crewmembers on the vessel. On the right of the same image is an EPIRB of the type and manufacture that was carried on the SCANDIES ROSE. The figure gives a perspective as to the size of the devices in comparison to one another. (Source Coast Guard)

In testimony, the SAR Program witness talked about PLBs and how they provide distress alerts to rescue forces

> *And PLBs, which are Personal Locator Beacons, which are basically -- any commercial or any private person can purchase these and own them. Once you've registered them that helps the Search and Rescue Satellite-Aided Tracking System identify who the person in distress is. When the device is turned on or activated, approximately every 50 seconds, it sends a signal, which is received by one of these many satellites that are around the globe. When a satellite receives that signal, it transmits it to the associated local user terminal, and then transmits that to the mission control center, which determines the location of the distress alert and transmits it to the appropriate rescue coordination center.*[262]

If at least one of the survivors abandoned the vessel with a PLB and activated the device, a Rescue Coordination Center ashore would have received the PLB distress signal with its precise location. Acting on that information and other information, the aircraft and vessels that were dispatched to make the rescue would have been able to home in on the location of the PLB, and that survivor, even in darkness and in severe weather. The use of a PLB would most likely have reduced the time required to effect the rescue and more importantly the time that any survivors would have been exposed to the frigid and severe marine environment.

[262] Mr. [redacted] MBI Hearing Transcript, Pg. 1531

5.9.9. Digital Selective Calling (DSC)

Condition and Valuation Reports for the SCANDIES ROSE included photographs of the vessel's communications equipment. Figure 105, below, shows two VHF radios mounted on the overhead console of the wheelhouse starboard operating station. Both of these radios are models equipped with the DSC feature as indicated by the red "distress" plastic cover on the push button that would then activate the DSC alert. The Marine Board found no evidence that these radios noted figure 105, below, were set up and properly configured with the SCANDIES ROSE's Maritime Mobile Service Identity (MMSI) number[263] and with a GPS input to provide positional information if the feature was used in a distress situation.

Figure 105 – Marine VHF radios above the starboard control station on the SCANDIES ROSE. The red arrows indicate the location of the DSC buttons on each radio. Each radio was manufactured with the DSC feature built in, but there is no evidence that this feature was properly configured with MMSI number and GPS input for use in an emergency. (Source CG Exhibit 004, with mark ups)

If the DSC is properly configured on the vessel's marine VHF radio, the mariner hits the red DSC button, then the MMSI number of the vessel along with the vessel's geographic coordinates will be received by nearby vessels and shore based VHF towers. The DSC feature gives the mariner a potential opportunity to egress a sinking vessel while still continuously broadcasting an emergency signal over VHF versus requiring the individual to stay at the operating station on the vessel and transmit a "mayday" message. The SCANDIES ROSE's initial "mayday" call was transmitted to the Coast Guard directly and received on HF. If the DSC feature had been an option for the SCANDIES ROSE, the Captain would have been able to press the button in addition to the "mayday" call and then turn his focus on alerting the crew, donning survival suits, and abandoning the vessel.

AIS systems use the same marine band on the radio, VHF, to transmit AIS signals from ship to ship as well as ship to shore. As an example of the radio range potential for DSC use, the Marine Exchange of Alaska was asked to locate an AIS vessel target with an AIS base radio station that would have been operational when the SCANDIES ROSE sank. The signal reception distance of the Marine Exchange AIS system can be increased by the height of

[263] MMSI are numbers used maritime DSC, AIS, and certain other equipment to uniquely identify a ship or coast radio station (Coast Guard Navigation Center)

their terrestrial radio sites, something that may be a limiting factor in other places in the country.

In support of the Marine Board, the Marine Exchange of Alaska, identified a vessel's AIS signal, the commercial tug POLAR STORM, and the Marine Exchange's site antennas picked up an AIS ship target in July 2021 close to where SCANDIES ROSE sank off Sutwik Island.[264] To illustrate the potential propagation of DSC based VHF radio signals figure 106, below, shows that one of the Marine Exchange of Alaska sites at Pilot Point received the VHF/AIS radio signal for the tug POLAR STORM at a distance of 67.11 NM with an antenna with a height of 40 ft. It is unclear what the meteorological conditions were, or time of day the Marine Exchange of Alaska successfully received this message. Pilot Point is the site due North of POLAR STORM on the Bering Sea side of the Alaska Peninsula and it is indicated by the orange arrow in figure 106.

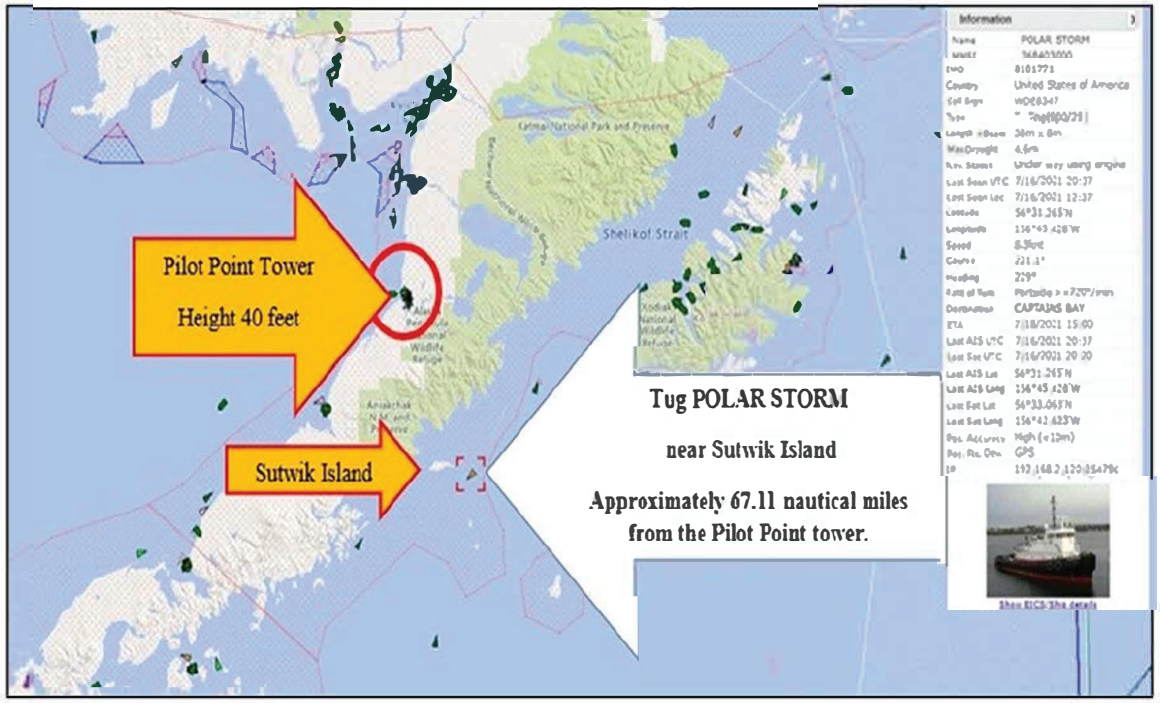


Figure 106 – Position of the POLAR STORM derived from a VHF based AIS signal and received at a Marine Exchange of Alaska 40-foot-high radio tower at Pilot Point, 67.11 nautical miles north of the POLAR STORM. The height of the radio antennas on the POLAR STORM are approximately the same as on the SCANDIES ROSE. This illustrates the potential for VHF based DSC distress alerts to be received by vessels and shore stations. The green symbols on the chart are AIS equipped vessels. (Source Marine Exchange of Alaska, with mark ups)

Digital Selective Calling is not a mandatory requirement for smaller commercial fishing vessels in Alaska like the SCANDIES ROSE. The FCC Public Notice dated 2016 states **(bolding and red highlight added by the Marine Board for emphasis):**

> *The Wireless Telecommunications Bureau reminds* ***owners and operators of fishing vessels (i.e., commercial vessels that catch and/or process fish and other marine life) of 300 gross tons and upward, and small passenger vessels (i.e., ships that transport seven***

[264] The POLAR STORM was a commercial tug with an antenna height at approximately the same height as the SCANDIES ROSE.

to twelve passengers for hire *in the open sea or any adjacent tidewater of the United States), that they must upgrade to VHF radiotelephone equipment that includes digital selective calling (DSC) capability no later than January 20, 2016. These vessels are exempt from the VHF-DSC carriage requirement until one year after the United States Coast Guard (USCG) notification to the Commission that shore-based Sea Area A1 coverage has been established.*

On January 20, 2015, USCG notified the Commission that it had published a notice in the Federal Register declaring ***Sea Area A1 within twenty nautical miles seaward*** ***of the territorial baseline along the East, West, and Gulf coasts of the United States****,* ***excluding Alaska****,* ***and including Hawaii, Puerto Rico, Guam, the Virgin Islands of the United States, and the Northern Mariana Islands of Saipan, Tinian, and Rota. Consequently, the exemptions from the VHF-DSC carriage requirement for fishing vessels and small passenger vessels operating in those areas expire on January 20, 2016.***

The Coast Guard Navigation Center on its website[265] makes the following statement about DSC capabilities

The U.S. Coast Guard offers VHF and MF[266]/HF radiotelephone service to mariners as part of the Global Maritime Distress and Safety System. This service, called digital selective calling (DSC), allows mariners to instantly send an automatically formatted distress alert to the Coast Guard or other rescue authority anywhere in the world. Digital selective calling also allows mariners to initiate or receive distress, urgency, safety and routine radiotelephone calls to or from any similarly equipped vessel or shore station, without requiring either party to be near a radio loudspeaker. DSC acts like the dial and bell of a telephone, allowing you to "direct dial" and "ring" other radios, or allow others to "ring" you, without having to listen to a speaker. New VHF and HF radiotelephones have DSC capabilities.

The CG website **(bolding and red highlight added by the Marine Board for emphasis)** goes on to say:

*****The Coast Guard urges, in the strongest terms possible, that you take the time to interconnect your GPS and DSC-equipped radio. Doing so may save your life in a distress situation! Before interconnecting your radio & GPS consult the owner's manuals.***

The SCANDIES ROSE is a commercial fishing vessel less than 200 GTs and operated in Alaska, which is specifically excluded from the provision requiring that the vessel have its marine VHF radio capable of DSC functionality despite the fact that the region experiences some of the most severe and hazardous weather environments in the world. Requiring the simple activation of the DSC feature on the existing marine VHF radios would significantly improve the emergency communication capabilities for vessels that operate in extreme

[265] Coast Guard Navigation Center Website DSC Page - https://www.navcen.uscg.gov/digital-selective-calling
[266] Medium Frequency

environments such as the Bering Sea. Furthermore, equipping and training the crew on vessels such as the SCANDIES ROSE and other fishing vessels of similar size with DSC enabled radios would significantly increase the network of potential DSC relay stations and supplement the growing number of Marine Exchange of Alaska radio receiving towers equipped to receive DSC transmissions along the Alaskan Coast.

5.10. Survivability Factors

5.10.1. Environment

The accident occurred in December 2019, in winter conditions where air temperature was 10° and water temperature was approximately 38° Fahrenheit. These temperatures magnified the risk of operating in this hazardous environment due to the risk of cold water exposure. The U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement, COMDTINST M16130.2F, describes the effects of cold water shock

> *Sudden immersion into cold water stimulates a large aspiratory gasp response (involving one to several breaths) that may be followed by hyperventilation plus substantial increase in blood pressure and heart rate. If entry into the water involves complete head-under submersion, the gasp reflex could result in immediate drowning. Subsequent hyperventilation will normally diminish within seconds to minutes but could be increased and exaggerated due to emotional stress and panic. Uncontrolled hyperventilation can cause numbness, muscle weakness or even fainting, leading to drowning. Either of these respiratory responses can lead to aspiration of water into the lungs; panic, with subsequent drowning. Cold shock can occur in water colder than 20°C (68° F) with symptoms increasing as water temperature decrease to freezing. Healthy individuals may succumb to cold shock through uncontrolled respiratory responses, while those with underlying cardiac disease may experience sudden death due to cardiac arrest or ventricular fibrillation (uncoordinated heartbeats).*[267]

With the reported environmental conditions at the time of the accident, the crewmembers of the SCANDIES ROSE would most likely have experienced cold water shock if they were unprotected by immersion suits. Exposed to seawater in a heavily listing, sinking vessel and the possibility of sudden immersion in the frigid sea water, they would not have had the manual dexterity to don the immersion suit in time to prevent the onset of hypothermia and risk of death.

Once the cold seawater flooded the vessel's inner compartments and living quarters, the crew's survivability chances were minimal. The crew would have most likely experienced cold shock and cold incapacitation. Cold shock and severe hypothermia would have impacted the crewmembers who were unable to egress the SCANDIES ROSE within minutes.

If not wearing an immersion suit or entering into a deployed liferaft, the crew's chances of survival was severely limited without immediate assistance and rescue. Quickly donning the

[267] U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement, COMDTINST M16130.2F, Pg. 3-89, section 3.7.2.1

suit and making preparation to abandon the vessel, when necessary, is a fundamental requirement to ensure survivability. Had the Captain identified the emergency and alerted the crew when the list began to increase, the entire crew may have had more time to don immersion suits and prepare to abandon ship, increasing their chances for survival.

5.10.2. Crew's Inability to Abandon the Vessel

As the SCANDIES ROSE listed further and further to starboard, the vessel continued to lose buoyancy. With the vessel already in an at-risk stability condition from heavy ice accumulation and potentially other sources of negative stability, the vessel could not recover from the catastrophic stability loss with uncontrolled downflooding. Within a matter of minutes, the vessel started to capsize and sink. According to survivor testimony, there were no alarms sounded until after the mayday call was sent nor were general alarms raised to alert the crew to the developing emergency early enough to prepare for the possibility of abandoning the vessel. Those minutes would have been critical to make ready all lifesaving equipment, don immersion suits, and alert rescue forces. The Captain failed to identify when his vessel was initially in danger from the compromised stability resulting in the crew having very little time, if any, to react and abandon ship.

It is a challenge for any mariner to conduct emergency broadcast radio calls, don an immersion suit, and deploy the liferaft or EPIRB all within a matter of minutes in an emergency situation. The extreme list to starboard made the circumstances and ability to egress from the wheelhouse extremely difficult, if not impossible. While the SCANDIES ROSE was able to transmit a distress call on HF radio, other lifesaving equipment was either not utilized or partially utilized, most likely because of the lack of reaction time the crew had between the delayed identification of the SCANDIES ROSE's emergency situation by the Captain to the time the vessel capsized and sank. One survivor recounted how difficult the list of the vessel made it for crewmembers to don immersion suits

> [redacted] *was on the port side, the far port side.* [redacted] *was ... on the port side right by the door. And then* [redacted] *was trying to sit down and get his suit on, and I'm looking for a spot to put mine down, and I put it down, and I see that the boat's just too much at a[n] angle, and I'm going to slide. So I jump up into the bench, and I used the armrest as a foothold and stable… as soon as I did that,* [redacted] *comes sliding by me. And as soon as I did that, I get it on about halfway, my—the armrest breaks, so I kind of slide down…So I just started climbing up. I grabbed the middle armrest, and that breaks, and just -- I'm grabbing whatever. I don't even know what I was grabbing. I was just grabbing whatever to get out.*[268]

It is probable that the remaining crewmembers were also hampered by the severe angle of list when it came to putting on their immersion suits and subsequently egressing from the vessel's wheelhouse.

5.10.3. Limited Survival Time Without Immediate Assistance and Rescue

[268] Mr. [redacted] MBI Hearing Transcript, Pg. 1068-1069

With the exception of the Honolulu Search and Rescue Region (SRR), the Coast Guard's Alaska distance to travel to sites of distress is almost five times greater, and the time from launch to on-scene for rescue is two times greater than the rest of the Coast Guard.

In this case, search and rescue units did not arrive to the SCANDIES ROSE LKP until approximately four hours after the initial mayday call. Because cold incapacitation without protective measures can cause death within 5-30 minutes, the crew's chances of survival was severely limited without immediate assistance and rescue. Due to the approximately 400-mile roundtrip transit from Air Station Kodiak to the search area, the on-scene endurance of responding MH-60 helicopters was expected to be approximately one hour. The CGC MELLON was 185 NM to the SCANDIES ROSE LKP when diverted with an estimated 16-hour transit making best speed in the prevailing weather conditions. The MH-65 assigned to CGC MELLON was not fully mission capable at the time of the accident and was located at Dutch Harbor, AK. Had the helicopter been fully mission capable, its transit at maximum speed would have exceeded 1 hour and the 370-mile round trip would have fully expended the aircraft's fuel capacity, leaving little fuel to conduct search activities on-scene.

The weather on-scene the evening of December 31, 2019, was poor and delayed the CG-6038's ability to launch after D17 Command Center initiated the SAR case. Once the CG-6038 was on scene at the SCANDIES ROSE's LKP, the aircrew was limited in their ability to search due to adverse weather including visibility, wave height, winds, aircraft system reliability, and de-icing of the rescue swimmer after being hoisted from the first liferaft. Despite these challenges, the CG-6038 was able to successfully locate and rescue two survivors on their first flight. Unfortunately, no other crew or debris were ever located during the SAR response.

5.11. Accident Elements that were not a Direct Cause of the Accident

Determining compliance with established Coast Guard SAR standards is outside the scope and mandate of the Marine Board's investigation. Assessments regarding the effectiveness of any Coast Guard's SAR response is a function of the SAR Coordinator. The SAR Coordinator for the Juneau SRR and others in the SAR chain of command, may initiate a SAR case study consistent with COMDTINST M16130.2F, as a case review was conducted with limited scope.

5.11.1. SAR Resources

For the vast majority of the Juneau SRR, there is no Bravo-0 SAR response capability. Because of this, the Coast Guard relies on numerous other government agencies (OGAs) and other maritime partners to effect some level of SAR response. OGAs were not requested during this response due to the extreme weather conditions. The MH-60 helicopters and HC-130 aircraft that Air Station Kodiak operates are the most highly advanced and capable aircraft that the United States Coast Guard utilizes. The MH-65 aircraft is a short-range aircraft, and based on the geographic challenges of the Alaska operating environment, in Alaska these helicopters are utilized mostly as a deployed helicopter on an Alaska Patrol

(ALPAT) Cutter.[269]

In December 2019 and January 2020, the CGC MELLON was the cutter assigned to the area to conduct an ALPAT and it had an MH-65 assigned to it. However, at the time of the marine accident, the helicopter was in Dutch Harbor, AK and was not fully mission capable. However, even if the MH-65 had been fully mission capable and on board the CGC MELLON at the time the vessel was directed to make way at best speed to the SCANDIES ROSE's LKP, the helicopter's fuel capacity and range would have limited it from launching, flying to the search area, conducting a search for any length of time, and being able to safely return either to the CGC MELLON or a land based refueling station that could adequately support the helicopter.

5.11.2. SAR Readiness

In the Coast Guard's response to this marine accident, the first response asset, CG-6038, was delayed in their response to the incident. This was associated with measures taken to identify and mitigate the significant risk of this particular rescue mission. The CG-6038's Aircraft Commander on the initial rescue flight indicated that the risk management discussions and crew brief were longer than normal and required low-visibility route planning as a result of the severe weather conditions. Additionally, the fuel load was reassessed and the aircraft fuel tanks were topped off to maximize the aircraft's endurance. The Aircraft Commander commented in this testimony:

> *So we were trying to come up with a good route based on – we used the Windy app, ForeFlight, which is a program on our electronic flight bag, which is an iPad that we use for flight planning multiple routes to try to give us the most time on scene. And so we kind of spent some time coming up with that and then doing a good, you know, risk management discussion with the crew. And then we determined we needed to add fuel to the aircraft, so we ended up basically holding -- or adding the maximum amount of fuel that we can carry with the weight that we had, and with that, I mean, that time adds up. And then, once we get in the aircraft, with this weather that we're flying through, we had to do multiple checks in the aircraft with our blade de-ice/anti-ice equipment, which adds a little bit of time. And then just with the location of where the helicopter ramp is, when the weather's bad, a lot of times we'll taxi out to the main runways, which is a little bit of a haul to get out to the runways to depart.*[270]

Available Coast Guard SAR resources in Western Alaska include air resources from Air Station Kodiak with five HC-130 fixed wing long-range aircraft and six MH-60 medium range helicopters. Coast Guard Cutters also patrol the region, including a 378-ft cutter capable of launching and recovering a MH-65 helicopter. Historically, during a typical opilio crab season, or depending on the number of commercial vessels operating in the western Bering Sea region, Air Station Kodiak operates a Forward Operating Location (FOL) out of Cold Bay, AK with one MH-60. The Cold Bay FOL is opened in the fall and winter based

[269] An ALPAT is a Coast Guard term for a patrol of waters West of Kodiak, the Alaska Peninsula, the Maritime Boundary Line, Aleutian Islands, Bering Sea and Strait.
[270] LT [redacted] MBI Hearing Testimony, Pg. 1473

around the crabbing seasons. In October, a MH-60 is stationed at the FOL for a month or until the BSAI crabbing fleet reach 90% of the proposed catch or if the fleet reduces to less than 10 vessels. In mid-January, the Cold Bay FOL is stood up for the opilio crab season. The MH-60 operating out of Cold Bay can reach crab vessels operating in the region on the first sortie. There was no MH-60 operating in Cold Bay at the time of the SCANDIES ROSE sinking since the FOL in Cold Bay was not staffed at the time, which is typical for the period of time from November to January. The FOL stood up on January 9, 2020.

5.11.3. Search and Rescue Operations

The SCANDIES ROSE was able to put out one mayday call. It was extremely difficult to hear and had significant background noise and static. The COMMDET Kodiak watchstander heard that call and answered with no results. They then hailed the SCANDIES ROSE on an average of every 30 to 60 seconds for the next hour, with no success, to establish any communication to get a better location. Due to an error in the transposition of the coordinates from the first helicopter on-scene, a search model was built for an area north of Sutwik Island, which was used by the second MH-60, CG-6037. According to the SAR witness, the position was passed incorrectly. The second set of searches were based off of the D17 Command Center modeling the position of the second liferaft north of Sutwik Island based on the issue with the transposed position information. Given the on-scene weather conditions, the erroneous position would have placed the raft in a drift pattern opposed to the prevailing weather around the northeast tip of Sutwik Island.

Additionally, Sector Anchorage should have never been assigned as the SAR Mission Coordinator for this case, or had primary control of the SAR operations. The LKP for the SCANDIES ROSE clearly fell outside of Sector Anchorages SAR response AOR and in a region that JRCC Juneau retains SMC. The CDO at D17 should have taken extra effort to plot the position, and verify whose SAR geographic AOR the case fell in. The shift of SMC between D17 and Sector Anchorage took valuable attention for the SAR planners and created confusion at Air Station Kodiak, which led to delays.

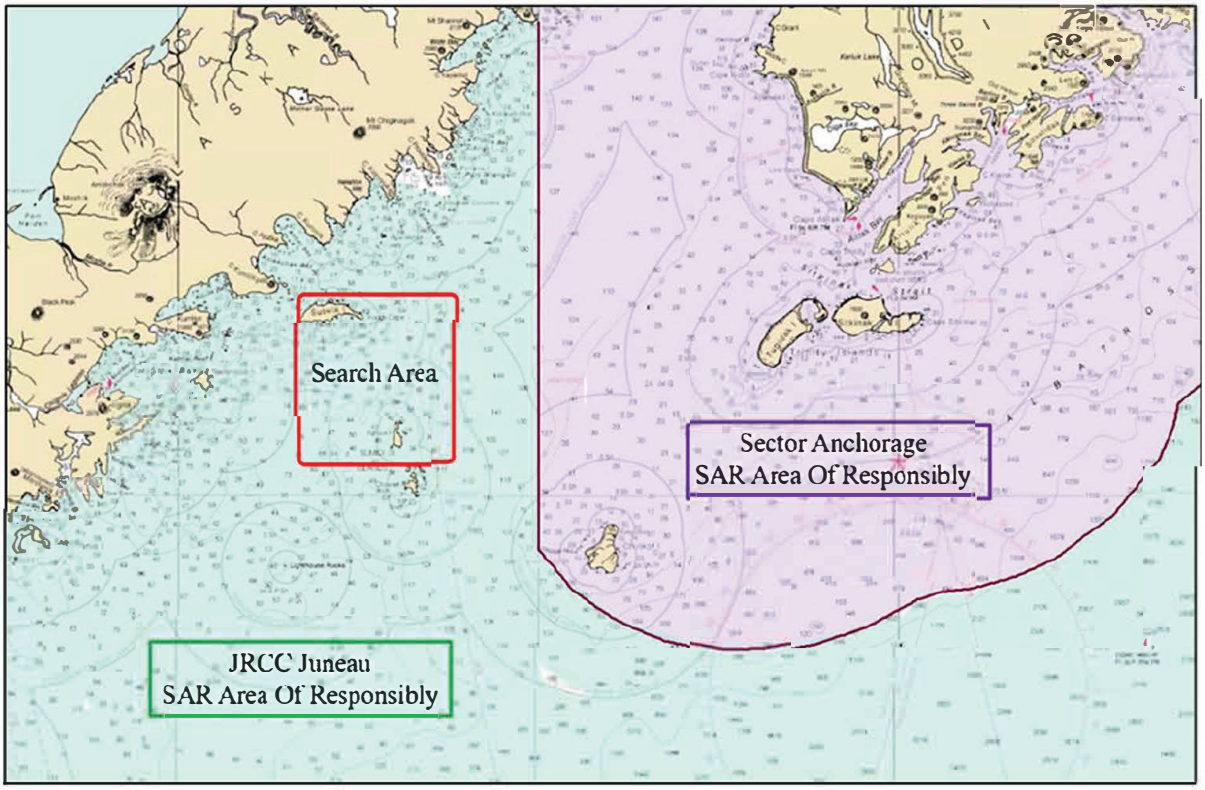


Figure 107 – Search and Rescue Areas of Responsibility in relation to Search area. (Source Coast Guard)

5.11.4. Radio Communication Gaps

The Coast Guard is not aware if the SCANDIES ROSE sent a mayday call over VHF-FM, or utilized the possible DSC option to alert their distress situation. While R21 has significant gaps in the Coast Guard's ability to hear distress calls in the Juneau SRR, this was not a factor in this accident. The crew successfully made a call on HF radio that was almost immediately received by COMMDET Kodiak.

The current R21 AK system does not meet Sea Area A1 radio coverage for VHF FM. There are significant gaps in the baseline system, but additionally there are significant gaps due to maintenance, physical distance between radio towers, and system capabilities. The limited VHF-FM radio coverage coupled with a lack of cellular telephone coverage degrades communications capabilities in the Juneau SRR. For this reason, the HF radios that the Coast Guard maintains are vital to the Coast Guard SAR mission in Alaska. As in this case, at the time of the accident, the Coast Guard maintained an active listening watch on the HF radio network and answered high frequency calls.

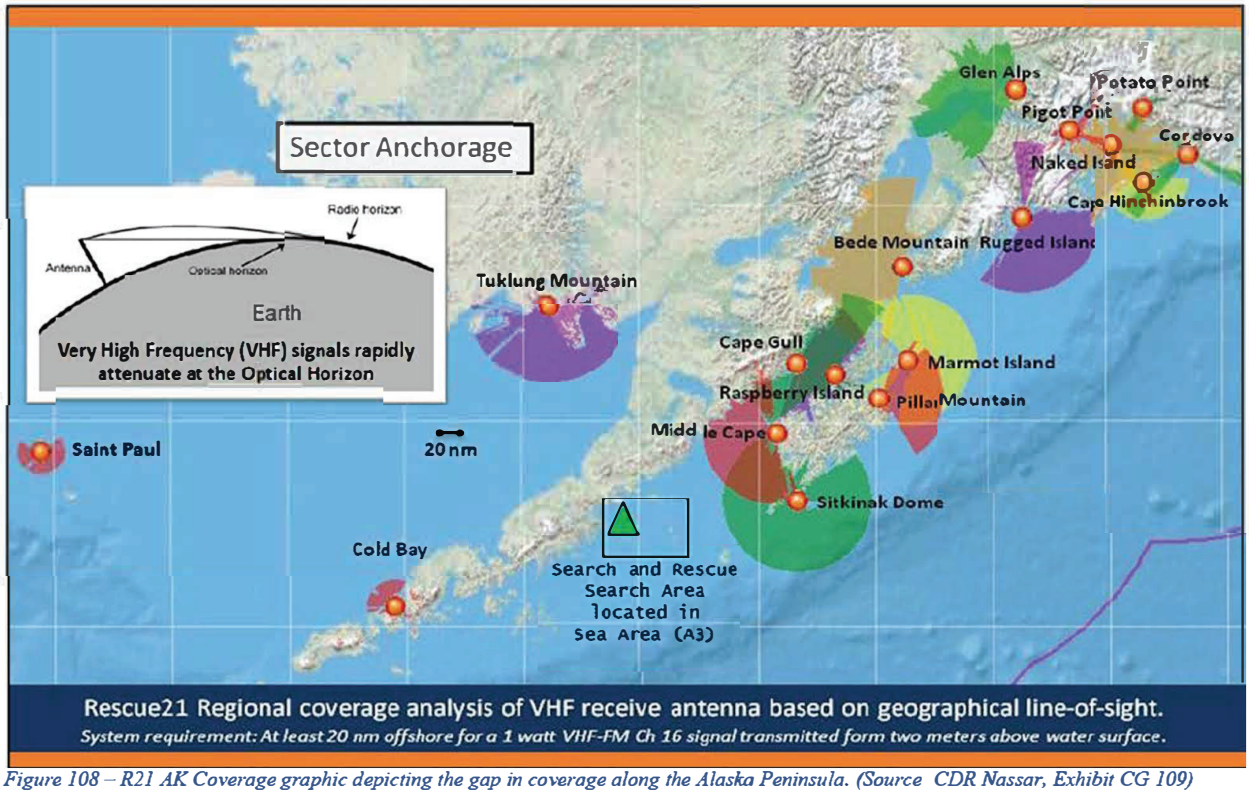


Figure 108 – R21 AK Coverage graphic depicting the gap in coverage along the Alaska Peninsula. (Source CDR Nassar, Exhibit CG 109)

During the SCANDIES ROSE accident there was no SAR Satellite-Aided Tracking (SARSAT) activation, the EPIRB signal, and the watchstander at COMMDET Kodiak was the only person to hear the mayday call on the HF radio. Even if the R21 system in Alaska is upgraded to meet Sea Area 1 requirements,[271] HF radio guards would still be required due to the long distances between the communication sites and the fishing activities offshore. It is this Marine Board's opinion that disestablishing or degrading the current VHF or HF systems without a suitable replacement would put lives at risk.

5.12. Crab Pot Ice Accretion Study

5.12.1. Initial Field Ice Accretion Experiment on CGC POLAR STAR

A field test was conducted aboard a Coast Guard ice breaker, the CGC POLAR STAR, using fresh water spray under non-controlled environmental conditions. Initial results from this test were introduced during the Marine Board Hearing. The results of this field test precipitated further study on ice accretion on crab pots. Additional details on this field test are contained in section 7.2.2 of this report.

[271] The Coast Guard defines Sea Area A1 as those areas where more than ninety percent of the area within 20 nautical miles seaward of the territorial baseline along the East, West and Gulf Coasts of the United States, excluding Alaska, and including Hawaii, Puerto Rico, Guam, the Virgin Islands of the United States and the Northern Mariana Islands of Saipan, Tinian and Rota, is within coverage of Coast Guard VHF Coast Stations that provide both a continuous watch for Digital Selective Calling, or DSC, distress alerts on Channel 70 and a capability to respond to distress alerts.

5.12.2. Coast Guard Formal Crab Pot Ice Accretion Study

The Marine Board formally requested that the Coast Guard Research and Development Center (RDC) examine the feasibility of conducting ice accretion testing on the formation and weight of ice on crab pots in a series of scientific experiments. The Marine Board provided input on the testing to the RDC, who then created a testing plan and a matrix for the testing of single and multiple crab pots of approximately the same size as the pots used on the SCANDIES ROSE and other Alaskan crab vessels. The RDC reached out to the U.S. Army Corps of Engineers' Cold Regions Research and Engineering Laboratory (CRREL) which is located in Hanover, NH to determine if that facility had the capability to conduct the ice accretion study. The facility had two testing chambers which could accommodate both the crab pots and the environmental parameters necessary for the testing. The RDC acquired three crab pots and the associated gear that would fit inside these pots to replicate the pot configuration carried on the SCANDIES ROSE. These pots would be slightly smaller than the SCANDIES ROSE pots, sized 6 ft x 6 ft x 36 inch while the SCANDIES ROSE pots were 7 ft x 8 ft x 34 inch in size. The steel, round-stock framed pots were configured in the same manner as the pots carried on board the SCANDIES ROSE.

Three weeks of testing took place in September 2021 at the CRREL Hanover, NH facility with facilities staff conducting the setup, spraying, and weighing of the pots using a wireless load cell. The RDC staff took measurements of the thickness of the ice forming on the pot frame at approximately 30-minute intervals during testing. The chambers were kept at -15^{o} Fahrenheit and the saltwater used for simulating freezing spray was kept at approximately 30^{o} Fahrenheit.

One of the aspects of freezing spray that the SCANDIES ROSE would have encountered were the effects of gale force wind and heavier water droplets from the interaction of the vessel and the breaking seas which would have created ice on the pots and the vessel itself. The facility could not replicate a wind tunnel effect, an important aspect in vessel icing, or the larger water droplets that might be formed when a vessel pounded into the sea and created sea spray. To conduct this testing, an oscillating nozzle was used to direct a pressurized saltwater spray directed at either the top, side, or corner as indicated in the testing plan for the type of testing required. Single pots or double or triple pots stacked vertically were used in the tests and the weight, thickness, and formation of ice in the vertical pot stack was also recorded. A representative of the NSTB attended one of the day's tests and witnessed the testing methodology.

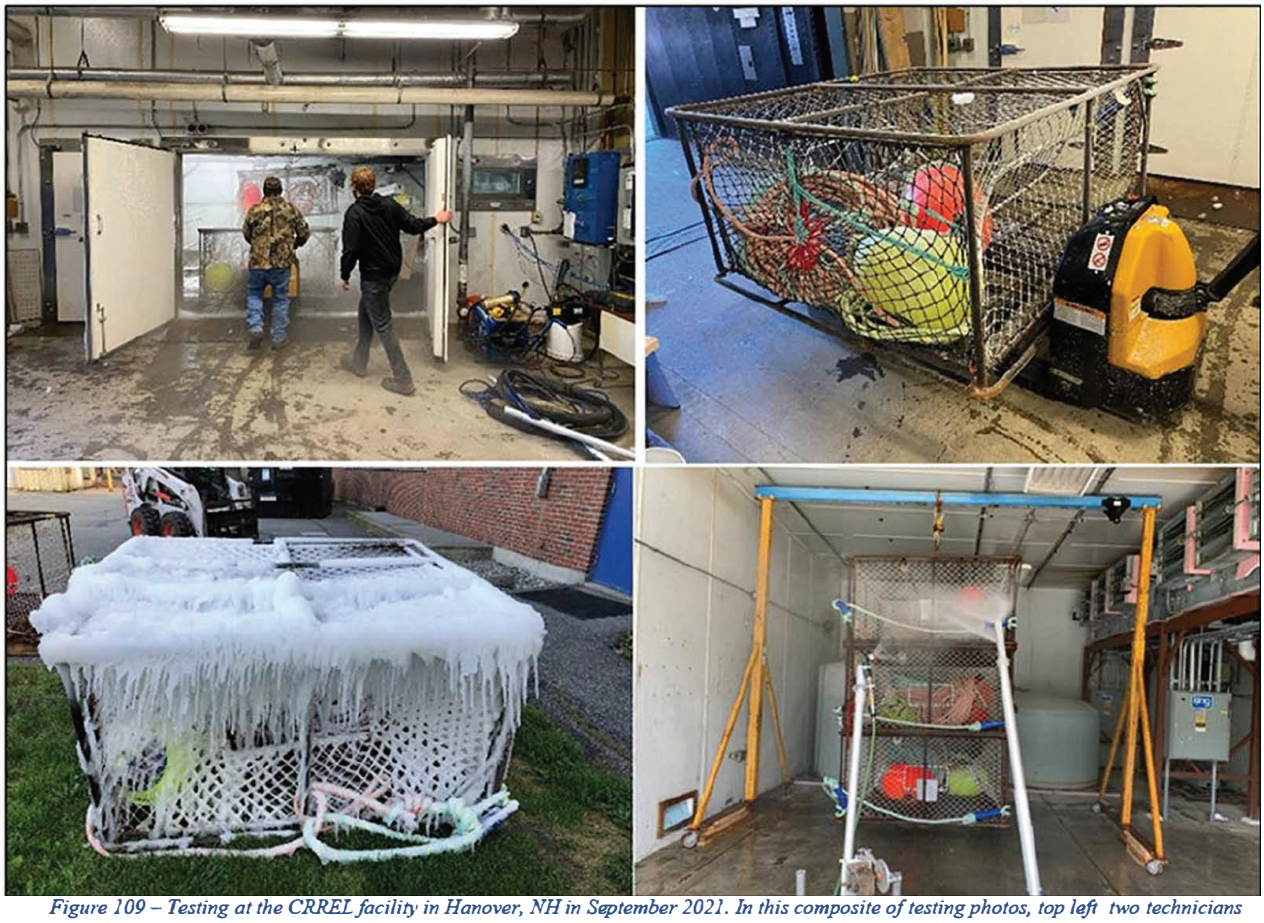


Figure 109 – Testing at the CRREL facility in Hanover, NH in September 2021. In this composite of testing photos, top left two technicians enter the smaller of the two test chambers to set up for two vertical pot stack testing. Top right one of the pots with the associated gear being maneuvered into the test chamber. Lower, left a single pot after removal from the chamber showing the formation of ice on the single pot. Lower right inside the larger chamber with a triple pot stack hanging from the load cell. In the foreground are the two oscillating sprayers directing saltwater spray onto the triple pot stack based on the configuration requirements in the test plan matrix of tests. (Source Coast Guard)

During the testing, the weight of the pots was continuously monitored and recorded and ice thickness was manually measured at half-hour intervals at twelve points around the top of the pot framing. Two tests were conducted where pots were covered with polystyrene tarpaulins to compare results of ice accretion with uncovered pots.

5.12.3. RDC Crab Pot Ice Accretion Testing: Preliminary Observations

The formal results of the RDC Ice Accretion Study has been published as a Rapid Evaluation and Analysis of Critical Technologies (REACT) Study.

HYPERLINK: Enclosure (2) contains hyperlink (8) which is the RDC's Ice Accretion REACT study report.

Some of the preliminary findings are provided here for illustration purposes.

One of the aspects of this series of experiments was to determine the thickness of ice created by a saltwater spray on crab pots on a vessel. The two survivors testified about ice they saw form on the vessel and the crab pot stacks from their vantage point in the wheelhouse of the SCANDIES ROSE. Onboard the vessel, the distance from the wheelhouse to the forward pot stack would have been approximately 65 ft. At the conclusion of one of the tests on the triple pot stack, the stack was moved outside the chamber and placed approximately 45 feet from the camera and the camera would look at the top of the stack from an angle roughly simulating the viewing angle from the SCANDIES ROSE wheelhouse. In figure 110, below you can see the difficulty of accurately determining the thickness of ice when there is no reference point for the frame of the pots. One can also see an example of how the ice formed vertically in a stack of pots in the test chamber, and, in addition to the accretion on the frame, developed overhanging icicles of three-foot length.

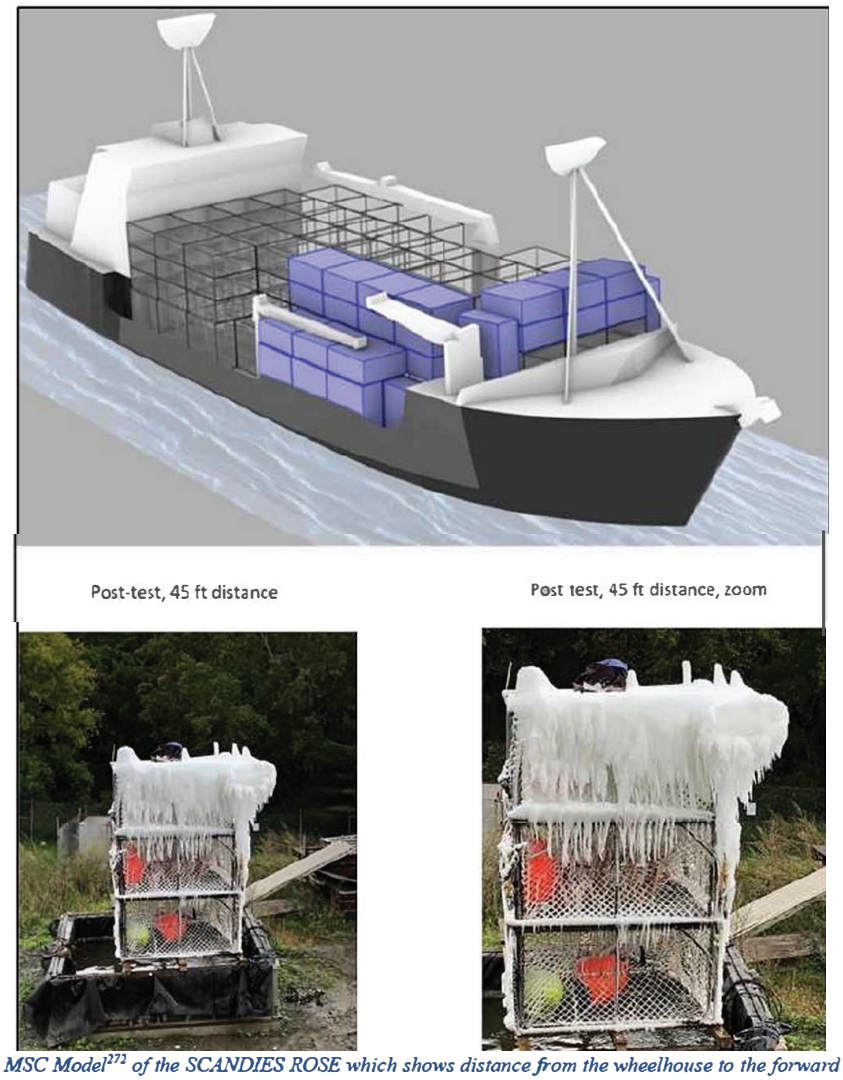


Figure 110 – Top, MSC Model[272] of the SCANDIES ROSE which shows distance from the wheelhouse to the forward parts of the vessel and the potential ice load for 24 of the crab pots onboard which would have had the highest exposure to heavy freezing spray, indicated by the purple color. Below left, a triple pot stack when viewed at a distance of 45 feet showing the thickness of ice. Below right, a close up at the same distance showing the type of ice that formed vertically on the mesh and inside the pots. (Source Coast Guard)

[272] CG Exhibit 138, MSC Analysis of Asymmetric Icing SCANDIES ROSE

Examples of some of the weights and thickness measurements on the pots and the elapsed time of the various tests are contained in figures 111 and 112, below.

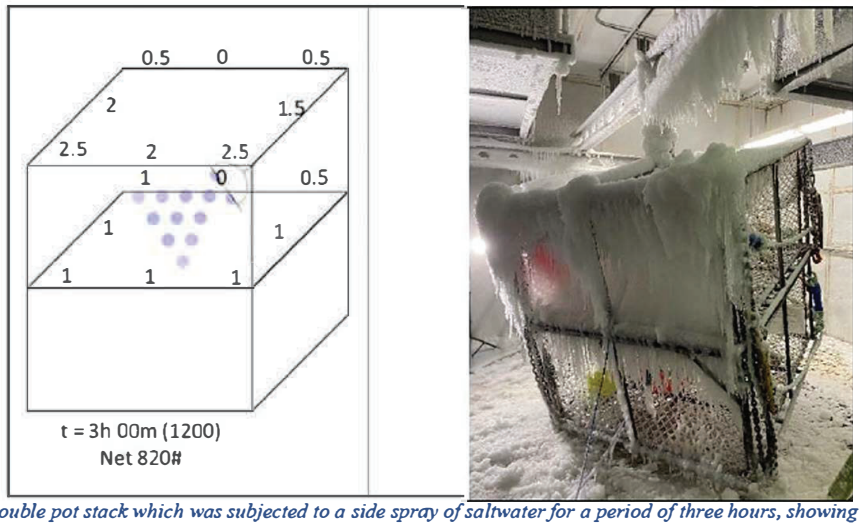


Figure 111 – A double pot stack which was subjected to a side spray of saltwater for a period of three hours, showing a net weight gain of 820 pounds and extensive amount of external ice which included ice on the suspending chains attached to the overhead load cell. In the diagram at the left top, one can see the thickness of ice on top of the pot frame and along the bottom frame as indicated by the associated measurements in inches. (Source Coast Guard)

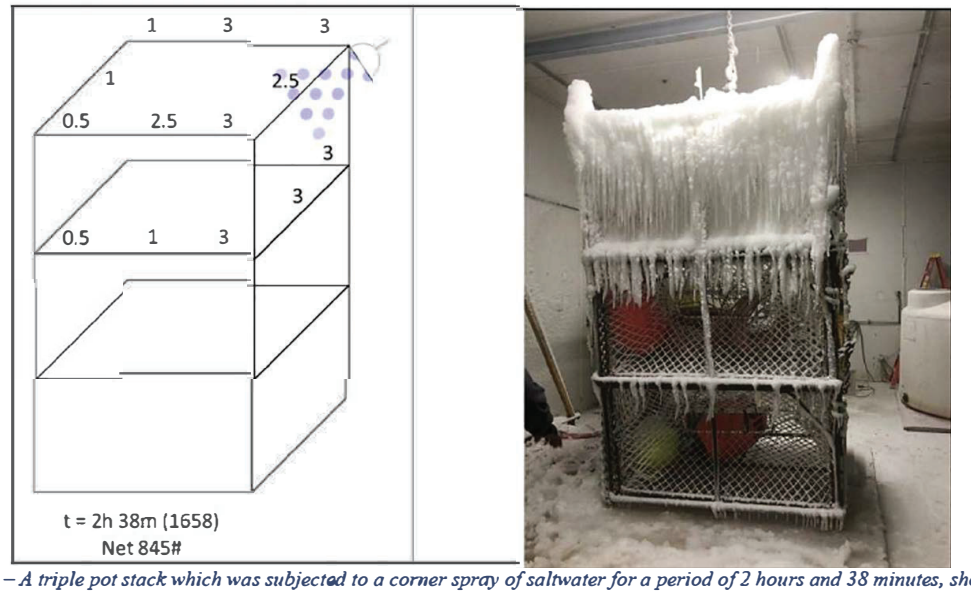


Figure 112 – A triple pot stack which was subjected to a corner spray of saltwater for a period of 2 hours and 38 minutes, showing a net weight gain of 845 pounds and the suspending chains attached to the overhead load cell. In the diagram at the left top, one can see the thickness of ice on top of the pot frame and along the bottom frame as indicated by the associated measurements in inches. (Source Coast Guard)

6. Conclusions

6.1. Cause of the Casualty

6.1.1. The initiating event for this casualty occurred when the SCANDIES ROSE maintained course and speed in deteriorating and dangerous weather. The Captain of the

SCANDIES ROSE failed to seek refuge as the freezing spray, which was forecasted, and ice continued to form on the vessel during the morning of December 31, 2019. At approximately 11:30 a.m. the vessel continued on its course and speed to the fishing grounds. All of the actions and decisions made by Captain [redacted] that caused the SCANDIES ROSE to continue on the intended voyage as opposed to seeking a safe harbor along the route travelled cannot be precisely determined, as the Captain perished in the accident and he did not communicate his reasoning to the surviving crew. Based on the available evidence and analysis, the causal factors were:

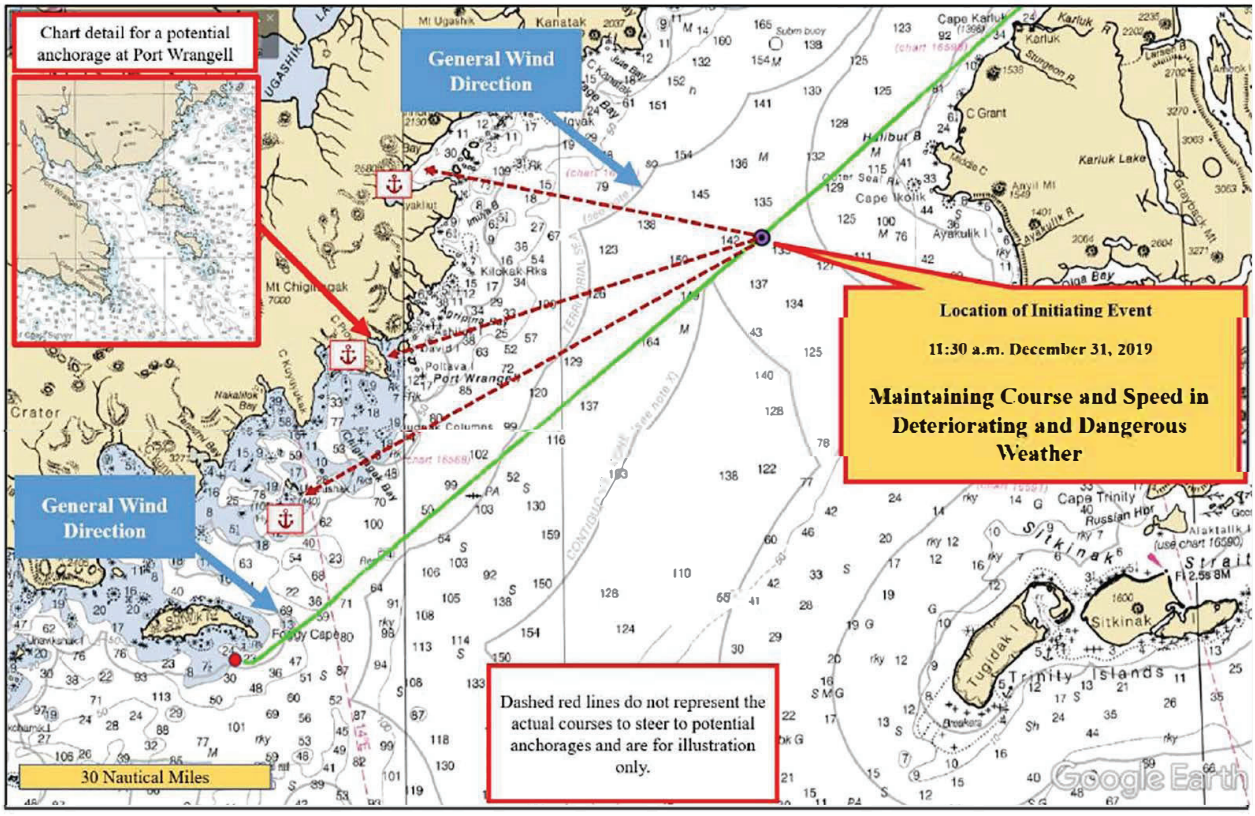


Figure 113 – Location of the "Initiating Event" for the accident, the decision point where the Captain of the SCANDIES ROSE maintained course and speed towards False Pass, despite the dangerous anticipated weather, phone call to the AMATULI, ice having formed on the vessel and pots and daylight to observe his vessel. The red dashed lines indicate potential points where the SCANDIES ROSE might have anchored due to the weather and ice formation which would have afforded the vessel protection from the ice formation. (Source Coast Guard)

6.1.1.1. The Captain had to contend with a delayed departure from Kodiak and then rushed in order to meet perceived catch and delivery expectations. Internal and external stressors created a situation causing Captain [redacted] to press to get to cod grounds to catch and land cod in order to establish a catch history in the event rationalization discussions began again for this species.

6.1.1.2. The SCANDIES ROSE maintained course and speed into weather of increasing severity. The vessel transited into a forward or beam wind on the starboard side of the vessel with air temperatures of approximately 12° Fahrenheit, which caused ice to build, and no widely recommended practices were utilized to reduce ice load accumulating on the vessel.

6.1.1.3. The Captain of the SCANDIES ROSE directed his crew to proceed on its voyage through an area between Shelikof Straits and Sutwik Island that was known by other fishermen to have unique winter environmental conditions which contributed to even greater accumulation of ice than the forecasted conditions.

6.1.1.4. The Captain did not exercise prudent judgment and seamanship in seeking a place of refuge when faced with the worsening weather conditions as other vessel captains had done. The Captain of the SCANDIES ROSE did not attempt to get into the safety of any of the sheltered areas along the strait that could have provided safe refuge. The decision to seek shelter was not made until later in the evening of the accident day when the weather had seriously deteriorated and the icing had substantially impacted the vessel's stability.

6.1.2. Based on stability instructions available to him, the Captain of the SCANDIES ROSE continued to operate the vessel in a loading condition which was, unknowingly to him, not in compliance with safe operating limits despite the loading condition being within the allowances for pot load, fuel, water, and other weights listed in the stability instructions developed in 2019.

6.1.2.1. Based on post-accident analysis of the loading conditions and corrected modeling for the SCANDIES ROSE, the Captain was sailing in a condition with marginal stability even in the absence of additional topside weight such as ice.

6.1.2.2. The stability instructions were prepared by the Naval Architect who conducted an incomplete inclining experiment and applied the inaccurate results to the stability documents created for the SCANDIES ROSE and those who operated it. The Naval Architect failed to verify the accuracy of multiple variables necessary to produce accurate stability instructions for the SCANDIES ROSE. In failing to do this, the Naval Architect, a state certified Professional Engineer, created a latent unsafe condition for the vessel.

6.1.2.3. The Captain departed Kodiak aware of forecasted heavy freezing spray warnings issued by the NWS and with a crew that was most likely impaired by fatigue. That impairment compromised their ability to recognize the dangers imposed by the buildup of ice and then avoid the buildup of ice and remove the ice accumulations on the vessel while enroute to the fishing grounds.

6.1.2.4. The breaking seas, as the weather intensified, threw seawater droplets and created a heavy freezing spray creating ice on the vessel. Weather forecasting was accurate in terms of warning of gale force weather and heavy freezing spray and this important information was available to the crew through a variety of sources.

6.1.3. Following the failure to seek timely refuge, the Captain directed or allowed the vessel to continue the transit to the southwest with worsening weather and seas creating a freezing spray along their intended track. As ice accumulated on the vessel, with a high

probability of increased ice accumulation on the starboard side, the vessel's center of gravity continued to shift upwards and to starboard. This caused a list to develop to starboard. This was coupled with reduced overall stability and reduced righting energy in the actual vessel characteristics as described in the MSC Analysis of the SCANDIES ROSE. Causal factors contributing to the reduction in stability were:

6.1.3.1. There is no evidence that the cause of the list to starboard was identified or was of concern to the crew. It should have been obvious to the navigation watch that something was seriously wrong with the condition of the vessel. The vessel listing a "couple of degrees" into a strong wind did not make sense and would require immediate corrective action. The SCANDIES ROSE was transiting in a southwest direction and the wind was acting against the vessel's forward starboard side, lending to the illusion that the list was minor in nature, a "couple of degrees," when in fact there was a dangerous situation developing onboard the vessel.

6.1.3.2. The rate of ice accumulation in the frigid environment was increasing as the sea state worsened and the winds increased.

6.1.3.3. The crew at the navigation watch and then the Captain of the vessel failed to appreciate the risks of how heavy freezing spray would impact the SCANDIES ROSE's stability or they lost situational awareness of the vessel's position in proximity to the area of predicted weather conditions through which the vessel was to travel. After the SCANDIES ROSE exited the Shelikof Strait they no longer had available places of refuge on the vessel's port side.

6.1.3.4. Based on the available evidence, the Marine Board concludes that the initial estimates made by the crew of the accumulation of ice and the initial reports of vessel listing were accurate, but the severity of the list was underestimated.

6.1.3.5. Evidence indicates that the most likely source of the list was the weight of ice, predominately on the vessel's starboard side. However, the Marine Board cannot rule out the possibility of downflooding of seawater into the vessel from some undetermined source.

6.1.3.6. Even with a reported list of approximately two degrees to starboard, the crew and captain neglected to take proactive steps to validate the source of the list or rule out other contributing sources of the list such as ingress of water. First, this was because there was no safe way to access the bow of the vessel as there was no walkway built into the pot stack arrangement. Visibility from the wheelhouse to effectively observe the pot stack was significantly reduced by the height of the pots and the distance and angle of observing the forward area on the vessel. Second, this was because the crew failed to thoroughly investigate the watertight integrity of the engine room space or other interior compartments such as the starboard pipe alley to rule out flooding, despite the fact that this was supposedly part of the navigation watch duties.

6.1.3.7. Despite vessel management being proactive in getting an updated 2019 stability test, the vessel was provided a substandard stability instruction based on incomplete information and a stability test not conducted in accordance with approved methods and standards. This new stability instruction was found to have significant inaccuracies in several assumed conditions.

6.1.3.8. The Captain of the SCANDIES ROSE failed to recognize or resolve the height of pots being loaded with the associated diagrams provided in the stability instruction. By loading pots to heights above the windows of the pilot house, the Captain accepted undue risk with regard to the vessel's overall stability, access to forward parts of the vessel, and visibility from the wheelhouse.

6.1.3.9. The stability instructions lacked clarity or detail on how icing posed a potential risk to the vessel or how icing was to be applied to the vessel and pot stack to maintain stability. The stability instructions failed to give proper guidance on the detrimental effects of the very real potential for asymmetric accumulation of ice which was a risk to the vessel in heavy freezing spray conditions.

6.1.4. The stability of the vessel continued to degrade and the starboard list increased to 20 degrees. Causal factors associated with the loss of stability were:

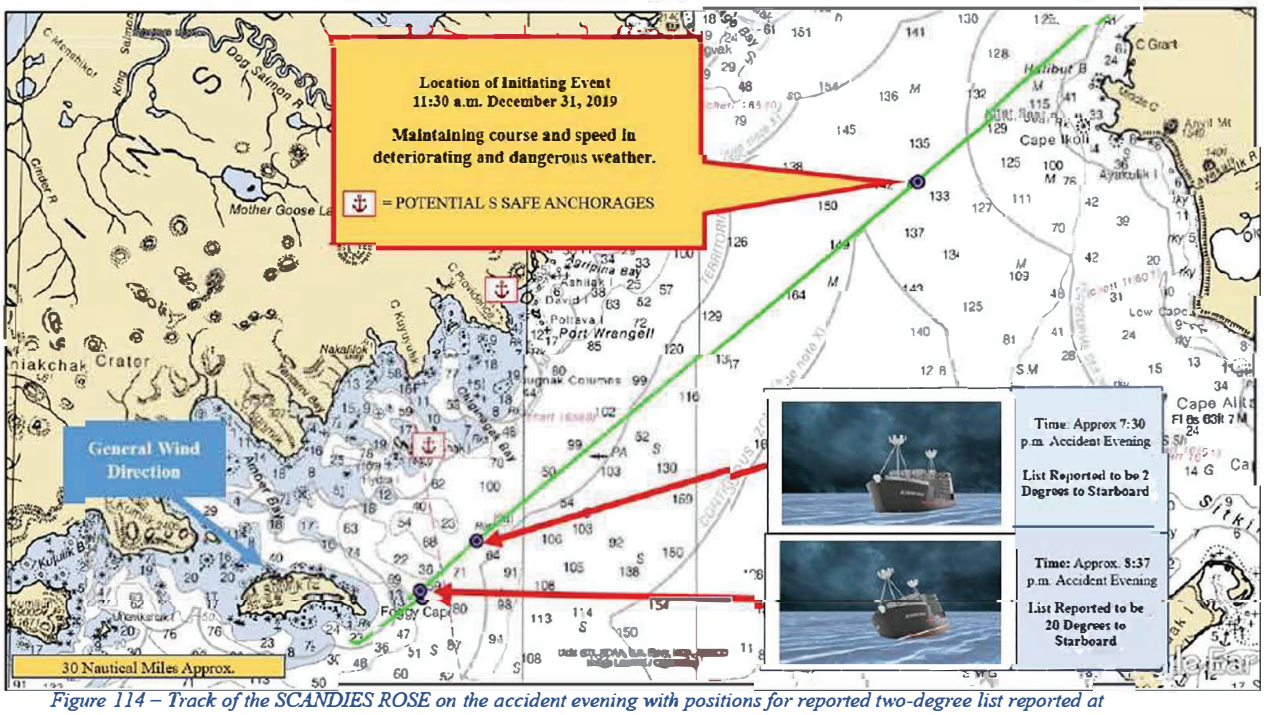


Figure 114 – Track of the SCANDIES ROSE on the accident evening with positions for reported two-degree list reported at approximately 7 00 p.m. and then the list of approximately 20 degrees reported at approximately 8 37 p.m. on the accident evening. Insets show the RHINO computer model visualization of the listing vessel superimposed for illustration purposes. (Source Coast Guard)

6.1.4.1. The Captain and crew failed to acknowledge and address that the change in list which went from "a couple of degrees" to the next reported measurement of list of 20 degrees to starboard was an emergency situation.

6.1.4.2. The aggregate accumulation of potentially asymmetric ice weight on the pots by this point likely exceeded the quantity which is required to be evaluated for stability using the "shoebox" method of a uniform coating of ice on the vessel as outlined in current stability regulations and standards.

6.1.4.3. Based on the available evidence, it is the opinion of the Marine Board that ice formed asymmetrically on the SCANDIES ROSE and the associated pots and gear, the precise extent of this uneven load cannot be determined.

6.1.4.4. The accumulation of ice on the starboard side may have partially blocked the freeing ports, reducing the ability for sea water to drain from the deck as designed. This would have increased water on deck with negative impacts to the overall stability.

6.1.4.5. The SCANDIES ROSE Captain informed the PACIFIC SOUNDER's Captain of the 20 degree list during a phone call but, even at that point, seemed to lack a sense of urgency about the vessel's stability condition. The stability condition of the vessel coupled with the hazardous marine weather created an emergency situation that he failed to recognize. The Captain of the SCANDIES ROSE took no action to wake the crew to muster in the wheelhouse, sound any alarms, investigate the source of the list, or take actions to reduce the list. Had he taken these actions, he would have given his crew valuable time to attempt to save the vessel or prepare to abandon the vessel, if necessary.

6.1.4.6. It is unknown if the increase in list was solely due to asymmetric ice accumulation on the starboard bow/side of the pot stack or to some other source of flooding such as hull failure, hull damage, or from a watertight opening that was inadvertently not secured.

6.1.4.7. Based on testimony from one survivor, the engineer exited the engine room. It is unknown if the Captain of the SCANDIES ROSE directed the engineer to transfer fuel/liquids or whether he or a crewmember investigated all possible causes of the vessel's list. Any attempt to correct the list using a potential transfer of liquids did not result in a positive impact to the vessel's stability and should not have been attempted until the cause of list was identified.

6.1.5. The SCANDIES ROSE Captain, on watch and at the helm, made a critical decision to turn to starboard and seek protected waters in the lee of Sutwik Island. Soon after the turn, the vessel listed even further to starboard and experienced a loss of maneuverability.

6.1.5.1. When the vessel made the sharp turn to starboard the west/northwest winds previously acting on its starboard side were now acting on its bow or its forward port side. These winds, in concert with the heavy seas, had previously been buttressing the vessel, causing the illusion of a lesser list, in effect propping the vessel up. When the dynamic forces from the winds began to act on the port side, the vessel's true list was felt and the wind force most likely significantly exacerbated the list to starboard,

exerting the force of the 60-70 kt wind on the vessel's port side. This was evidenced by the sudden and dramatic lurch to starboard described by a survivor.

6.1.5.2. The ice accumulation on the vessel increased the surface area for applied wind force.

6.1.5.3. With a heavy and sustained list to starboard, the vessel's underwater hull profile changed and likely reached the point where the propellers and rudder approached the surface of the water. The listing vessel would create a situation where the propeller and rudder would not work as designed and there is a possibility of loss of propeller force and cavitation in the large seas with the significant list.

6.1.5.4. External wind and wave action caused an increase to the heeling or capsizing energy from the environment. The vessel did not have enough righting energy to overcome these forces.

6.1.5.5. Decreasing the speed of the vessel changed the inherent dynamic stability of the vessel. The loss of propeller thrust would put the vessel at the mercy of the sea at a critical moment. This action was very dangerous in the already compromised condition of stability. This was exacerbated when the Captain pulled the throttles into the neutral position.

6.1.6. Subsequent to the vessel's loss of maneuverability, the vessel experienced a catastrophic and unrecoverable loss of stability and then buoyancy. Within minutes, seawater flooded the vessel's inner compartments causing the vessel to capsize. Causal factors contributing to the vessel sinking were:

6.1.6.1. Excessive water on deck and associated free surface effect.

6.1.6.2. The uncontrolled ingress of water into the interior of the vessel.

6.1.6.3. Uncontrolled downflooding and flooding into the engine room from the air vent intakes under the starboard ladderwell that were, by this point, under water.

6.1.7. As the vessel was lying at a severe angle and was actively flooding, two crew were able to exit the wheelhouse. They were on the port exterior side of the vessel when a wave washed them off the hull and into the sea. Causal factors contributing to the two crewmembers being washed off the vessel's hull were:

6.1.7.1. Severe wind and wave action acting on the survivors on the side of the listing vessel as it was already in a sinking condition.

6.1.7.2. Despite the difficulty in moving to evacuate the wheelhouse while wearing an immersion suit, the suits functioned as designed and insulated the two survivors from the worst effects of hypothermia.

6.1.7.3. The crewmembers recalled that they were outside the wheelhouse and were walking on what would have been the upper port side of the vessel so there were no designed safety points to stay with the vessel.

6.1.7.4. As the vessel began to sink, the survivors were swept into the sea.

6.1.8. Subsequent to the vessel's flooding and capsizing and crewmembers being swept off the vessel and into the frigid waters of the sea, the vessel sank with the remaining five crewmembers missing and presumed deceased. Causal factors contributing to the loss of life were:

6.1.8.1. The Captain failed to identify and take action when the vessel's stability condition reached a point where there was a sustained list to starboard into the prevailing wind. This denied the crew the opportunity to either investigate the list or prepare for the worst case, abandoning ship together with immersion suits worn and with the proper survival equipment including the EPIRB.

6.1.8.2. The late identification of the distress phase of the accident provided limited time and ability to take emergency action. This would include making more than one mayday radio call for assistance, activating the EPIRB, the entire crew donning immersion suits, deploying the liferaft, abandoning the SCANDIES ROSE and entering the liferafts.

6.1.8.3. Any crewmember trapped within the vessel would have succumbed by drowning.

6.1.8.4. Had any crewmembers, other than the survivors, been able to egress from the vessel, their survival time would have been extremely limited due to the effects of hypothermia.

6.2. Violations of Law by Credentialed Mariners: There were no credentialed or licensed mariners working on the SCANDIES ROSE at the time of the accident, thus, there were no acts of misconduct, incompetence, negligence, unskillfulness, or willful violation of law by a credentialed mariner that contributed to the casualty.

6.2.1. While not a credentialed mariner, the Captain of the SCANDIES ROSE failed to exercise prudent seamanship leading up to the accident voyage in the loading of the vessel in failing to build an alleyway to allow safer access to key areas of the vessel. He further failed to exercise prudent seamanship during the accident voyage by not taking early and deliberate action to prevent the dangerous accumulation of ice, failing to seek shelter when hazardous weather conditions persisted, imprudent to assign newly assigned deckhands to stand the navigational watch during an exposed segment of the voyage where the weather was expected to be deteriorating, and by failing to alert the crew of the stability emergency so that they could take timely action to effectively abandon the vessel.

6.3. Violations by Members of the Coast Guard or other federal, state or local agencies: There were no acts of misconduct, incompetence, negligence, unskillfulness, or willful violation of law by members of the Coast Guard or other federal, state, or local agencies that contributed to the casualty.

6.4. Violations Subjecting Parties to a Civil Penalty:

6.4.1. There is evidence that the marine employer was in violation of 46 CFR 4.06-20 by failing to ensure that post casualty drug testing was conducted in accordance with appropriate specimen collection requirements set forth in said subsection and 49 CFR part 40. In addition, the specimens that were collected were not handled and shipped in accordance with 46 CFR 4.06-40. However, based on the evidence and the totality of the circumstances of the case, the Marine Board recommends that no enforcement action be taken against the marine employer for this violation.

6.5. Violations of Criminal Law: This investigation did not identify violations of criminal law.

6.6. Need for New or Amended Laws/Regulations: This marine casualty represents the need to amend existing regulations. Specific recommended changes to regulations are outlined in section 8 of this report.

6.7. Unsafe Actions or Conditions that Were Not Causal Factors in this Casualty:

6.7.1. The majority owner, the operations manager and the vessel Captain of the SCANDIES ROSE failed to adequately ensure that the vessel was operated without the impairing effects of drugs (cannabinoids (marijuana)).

6.7.2. The majority owner, the operations manager, and the vessel captain of the SCANDIES ROSE failed to address the serious issue of workplace fatigue with the attendant consequences on critical decision-making for at least one of the navigation watchstanders.

6.7.3. There were communication issues between the searching units and SAR coordinators, most notably the inaccurate location for the second search pattern. These were ultimately resolved and had no impact on locating the survivors before the suspension of the search activities.

6.7.4. The majority owner, the operations manager and the Captain of the SCANDIES ROSE failed to adequately ensure that the vessel was operated by a crew that was medically fit to perform their duties. The crew's self-certifying questionnaires contained in the employment paperwork listed some medical conditions that could adversely impact any vessel operations and none of these medical conditions were reviewed by a competent medical authority.

7. Actions Taken Since the Incident

7.1. Coast Guard Search and Rescue

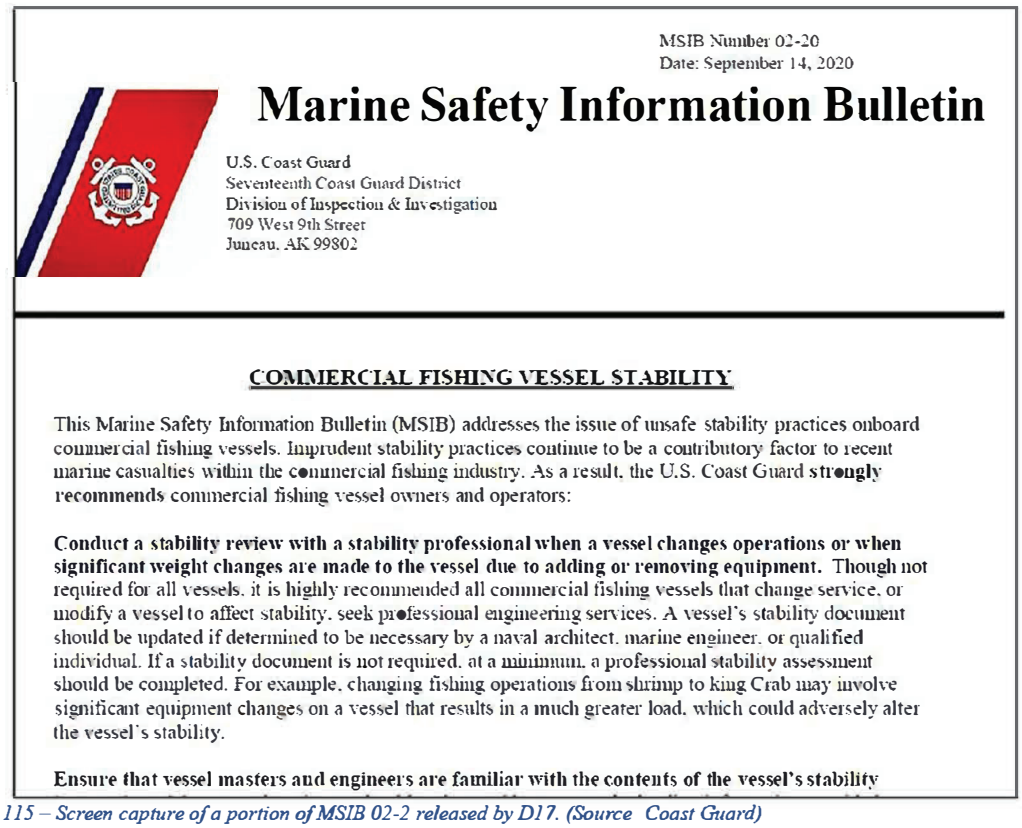
7.1.1. Coast Guard SAR Review

As a result of this incident, and consistent with COMDTINST M16130.2F, the Juneau SAR Coordinator/D17 Commander directed a SAR Case Review to examine limited aspects of the Coast Guard SAR response to the sinking of the SCANDIES ROSE. This included the alert and distress phases of the accident. The recommendations of this report will be made available to Coast Guard senior leadership as a means to enhance and improve the Coast Guard SAR System.

7.2. Coast Guard Prevention

7.2.1. Marine Safety Information Bulletins

7.2.1.1. D17 crafted and distributed MSIB 02-20 on November 25, 2020 to raise awareness on the importance of stability on fishing vessels.



MSIB Number 02-20
Date: September 14, 2020

Marine Safety Information Bulletin

U.S. Coast Guard
Seventeenth Coast Guard District
Division of Inspection & Investigation
709 West 9th Street
Juneau, AK 99802

COMMERCIAL FISHING VESSEL STABILITY

This Marine Safety Information Bulletin (MSIB) addresses the issue of unsafe stability practices onboard commercial fishing vessels. Imprudent stability practices continue to be a contributory factor to recent marine casualties within the commercial fishing industry. As a result, the U.S. Coast Guard **strongly recommends** commercial fishing vessel owners and operators:

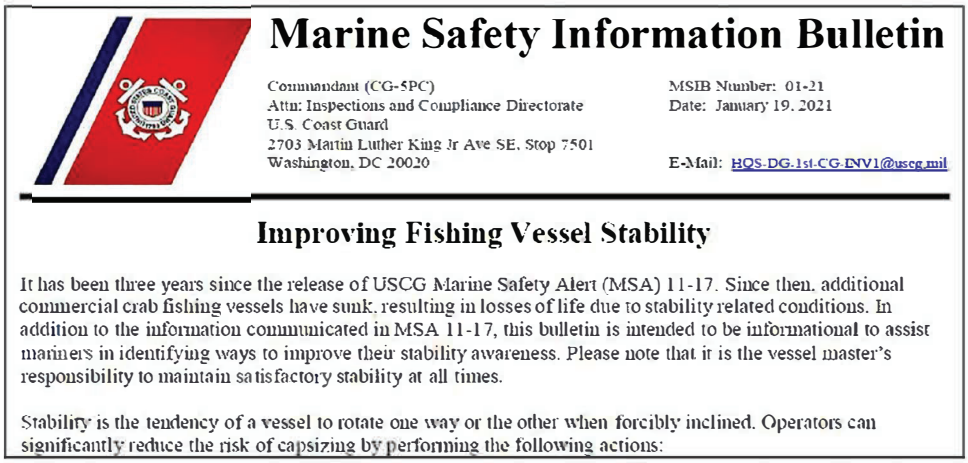
Conduct a stability review with a stability professional when a vessel changes operations or when significant weight changes are made to the vessel due to adding or removing equipment. Though not required for all vessels, it is highly recommended all commercial fishing vessels that change service, or modify a vessel to affect stability, seek professional engineering services. A vessel's stability document should be updated if determined to be necessary by a naval architect, marine engineer, or qualified individual. If a stability document is not required, at a minimum, a professional stability assessment should be completed. For example, changing fishing operations from shrimp to king Crab may involve significant equipment changes on a vessel that results in a much greater load, which could adversely alter the vessel's stability.

Ensure that vessel masters and engineers are familiar with the contents of the vessel's stability

Figure 115 – Screen capture of a portion of MSIB 02-2 released by D17. (Source Coast Guard)

7.2.1.2. This Marine Board worked with CG-INV, CG-CVC, and CG-ENG to craft a MSIB titled "Improving Fishing Vessel Stability" as urgent notification to the maritime community regarding stability and icing threats during winter fishing operations. MSIB 01-21 was released on January 19, 2021. The safety information bulletin provided the CFV industry with vessel stability best practices and emphasized the importance of vessel

owners and captains understanding, updating, and confirming the accuracy of their vessel's stability instructions.



Marine Safety Information Bulletin

Commandant (CG-5PC)
Attn: Inspections and Compliance Directorate
U.S. Coast Guard
2703 Martin Luther King Jr Ave SE, Stop 7501
Washington, DC 20020

MSIB Number: 01-21
Date: January 19, 2021

E-Mail: HQS-DG-1st-CG-INV1@uscg.mil

Improving Fishing Vessel Stability

It has been three years since the release of USCG Marine Safety Alert (MSA) 11-17. Since then, additional commercial crab fishing vessels have sunk, resulting in losses of life due to stability related conditions. In addition to the information communicated in MSA 11-17, this bulletin is intended to be informational to assist mariners in identifying ways to improve their stability awareness. Please note that it is the vessel master's responsibility to maintain satisfactory stability at all times.

Stability is the tendency of a vessel to rotate one way or the other when forcibly inclined. Operators can significantly reduce the risk of capsizing by performing the following actions:

Figure 116 – Screen capture of a portion of MSIB 01-21 released by Coast Guard Headquarters. (Source Coast Guard)

7.2.2. Informal Ice Formation Testing Onboard a Coast Guard Cutter

As the investigation progressed it was apparent that there was a need to determine the weight of ice that formed on the SCANDIES ROSE's crab pots via a scientific experiment that would reproduce the voyage's environmental conditions to the extent possible. In the interim and while awaiting setting up a scientific experiment, an opportunity presented itself aboard the Coast Guard Icebreaker POLAR STAR which was heading to the Arctic. Through joint coordination between the Marine Board, the Coast Guard's RDC, Sector Anchorage, Marine Safety Detachment Unalaska, and the CGC POLAR STAR, a crab pot and gear of the size and type that the SCANDIES ROSE would have carried on the accident voyage was borrowed for an informal field experiment. While the CGC POLAR STAR was underway in the Arctic, a non-scientific experiment was conducted where the pot was placed on the ship's open deck and a hose with a spray head would spray freshwater on the pot for a period of 72 hours in winter conditions.

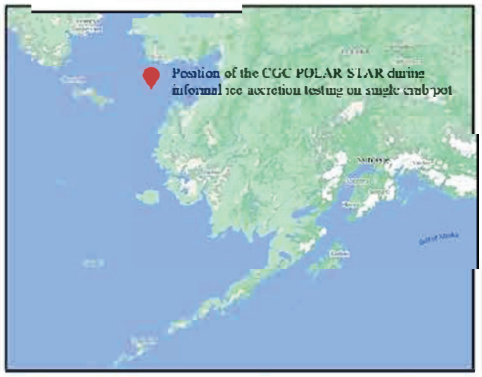


Figure 117 – The symbol on the map indicates the position of the Coast Guard's POLAR STAR when they were conducting the onboard single crab trap icing informal test. The test used freshwater over a 72-hour period with ambient air temperature at approximately 15° Fahrenheit. (Source Coast Guard)

At the end of the time period, the pot was broken free from the deck and suspended from a

ship's crane with a load cell in the lifting rig capable of weighing an object up to 3,000 pounds. The dry weight of the crab pot and gear at the start of the experiment was just under 1,000 pounds. At the conclusion of the 72-hour period, the pot encrusted with ice exceeded the capacity of the 3,000 pound scale. This non-scientific study was discussed in the MBI Hearing and would lead to a formal scientific study conducted by the RDC.

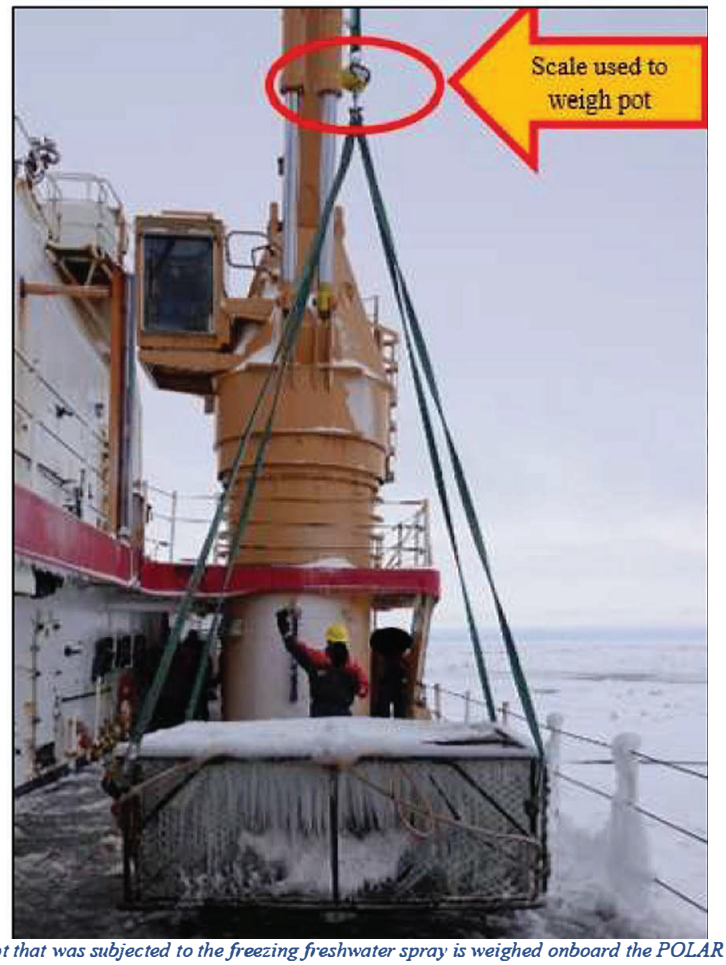


Figure 118 – The crab pot that was subjected to the freezing freshwater spray is weighed onboard the POLAR STAR at the conclusion of a 72-hour period. The yellow arrow points to the scale mounted in the lifting apparatus. (Source Coast Guard)

In late December 2020, the RDC began to formulate the plans to conduct the scientific tests. Information on that testing is contained in Section 5.12 of this Report.

7.2.3. SCANDIES ROSE Crab Pot Retrieval Efforts

The owners of the SCANDIES ROSE coordinated efforts to search for and successfully locate the wreckage of the SCANDIES ROSE. In September 2020, the Coast Guard coordinated with NOAA assets in an effort to retrieve some pots from the debris field. Recovery efforts were unsuccessful.

7.2.4. Wreck Information Broadcast and Charting

The Coast Guard published and broadcast information on the location of the SCANDIES

ROSE wreck and worked with NOAA to publish the wreckage location on the appropriate nautical charts for the area.

7.3. Actions taken by Industry Partners

7.3.1. Marine Exchange of Alaska

7.3.1.1. The Marine Exchange of Alaska is a vital link in the Search and Rescue network in Alaskan waters. On any given day, 60% of all marine vessels in Alaska are outside of the Coast Guard's search and rescue response standard in terms of the voice radio alerting capabilities. The Marine Exchange of Alaska acts as a significant partner in providing situational awareness in communications during search and rescue situations through its AIS network which encompasses a greater portion of the Alaska maritime area. Without this partnership, search and rescue operations would be significantly degraded.

7.3.1.2. Since the SCANDIES ROSE casualty, the Marine Exchange completed an in-house research and development project that focused on a DSC receiver system that they have started to install at some of their 131 Marine Safety Sites (antenna sites). As of August 2021, the Marine Exchange of Alaska has installed 13 DSC receivers and plans to install one receiver at each of their sites as they visit them for routine or unplanned maintenance. The receivers will alert watchstanders audibly and visually when a DSC distress alert is triggered, which would pinpoint the distressed vessel's geographic position if the MMSI is properly registered. These are the same AIS antenna system locations used by the Marine Exchange of Alaska for AIS vessel monitoring and Coast Guard units in Alaska have access to this AIS data provided by the Marine Exchange.[273]

[273] As of November 2021, testing of this function has not been completed. The Marine Exchange of Alaska has indicated that once they have conducted enough testing and analysis of their system and alerts, they will activate this function for the Coast Guard command centers.

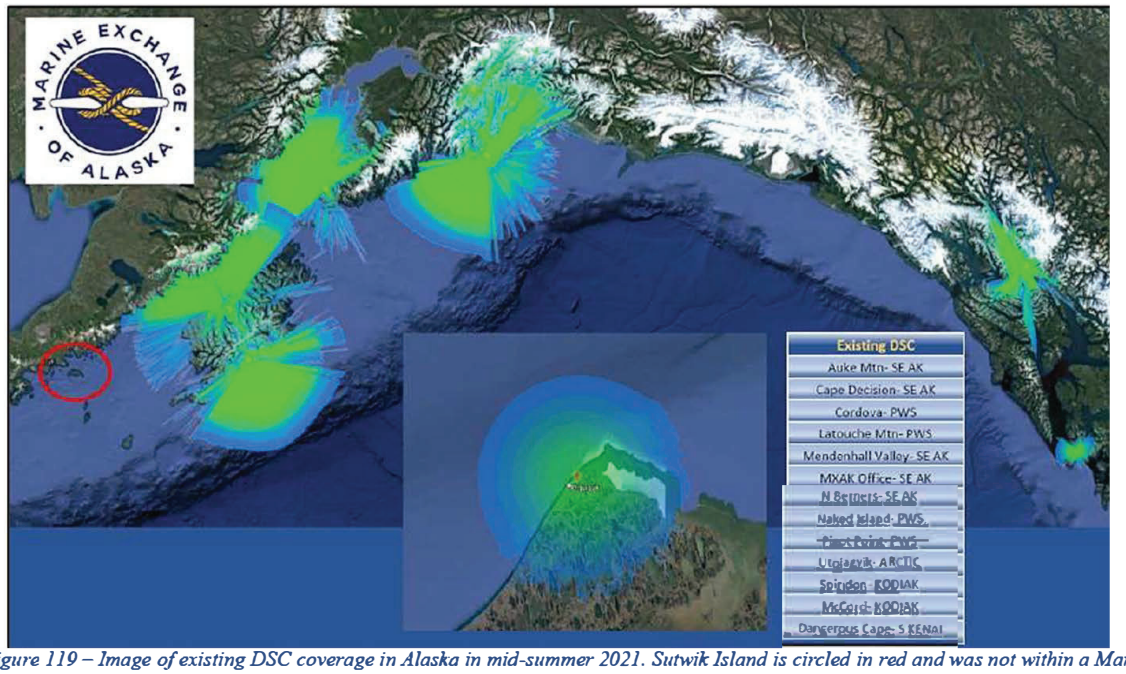


Figure 119 – Image of existing DSC coverage in Alaska in mid-summer 2021. Sutwik Island is circled in red and was not within a Marine Exchange DSC reception area at the time of the accident. (Source Marine Exchange of Alaska, with Coast Guard mark up)

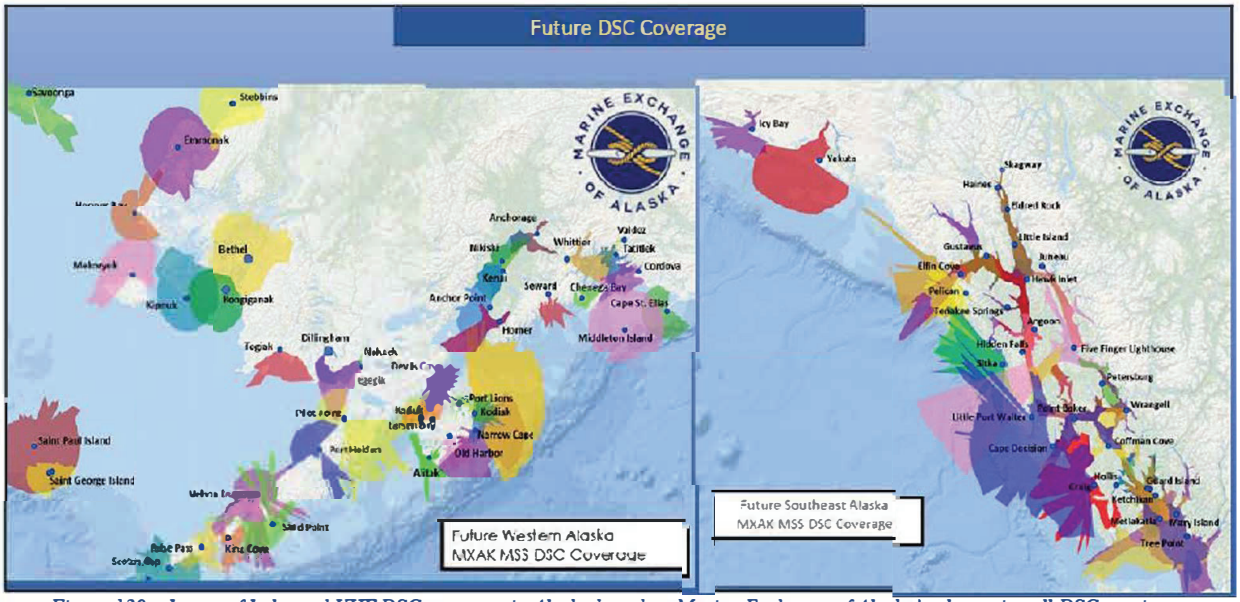


Figure 120 – Image of 1 planned VHF DSC coverage in Alaska based on Marine Exchange of Alaska's plan to install DSC receivers on their existing antenna sites. If all DSC receivers are installed as intended, the area in which the SCANDIES ROSE marine accident occurred will have DSC coverage. (Source Marine Exchange of Alaska)

7.3.1.3. The Marine Exchange of Alaska is concurrently conducting a research and development project on VHF-FM Voice over Internet Protocol (VoIP) for some of their Marine Safety Sites, mainly in areas which are known CG R21 coverage gaps. The Marine Exchange of Alaska is currently working with several commercial providers, hoping to have a VoIP system beta test ready for the Coast Guard to witness by fall of 2022.

8. Recommendations

8.1. Safety Recommendations

8.1.1. Recommend that the Commandant of the Coast Guard partner with the National Commercial Fishing Safety Advisory Committee (N-CFSAC) to establish a working group to draft and accept a Task Statement addressing safety of Commercial Fishing Vessels of less than 200 GTs. The Task Statement should specifically address the issues raised by this marine casualty, the total loss with fatalities of the SCANDIES ROSE, as well as the similar losses of the DESTINATION and LADY OF GRACE,[274] caused by vessel icing leading to a loss of stability. The Task Statement should address the following items:

8.1.1.1. In conducting the tasking, review the multi-year statistics (provided by the Coast Guard) regarding commercial fishing vessels of less than 200 GT accidents or losses that resulted in fatalities, injuries, or property damage. Major marine casualties in addition to this one, such as the loss of the DESTINATION, NO LIMITS, and other fishing vessels with multiple fatalities and vessel losses should be reviewed to provide the background information necessary to conduct the tasking and then make informed recommendations to the Coast Guard.

8.1.1.2. Examine and make recommendations to the Coast Guard on best practices to reduce and mitigate the negative consequences caused by the misalignment of state and federal regulations regarding drug laws legalizing the recreational or medical uses for drugs also classed as dangerous drugs by federal law and applicable transportation related statutes. This is critical for the safety of operations and creating an environment for vessel personnel to work in a drug-free workplace, with special emphasis on critical safety sensitive jobs such as navigation and engineering duties to bring fishing vessels into alignment with other commercial vessels. Develop recommendations that include testing for pre-employment, routine, and reasonable cause.

8.1.1.3. Examine and effectively disseminate recommendations for best practices to ensure full crew access to all parts of a vessel to allow for safe vessel operation. This task should address and examine things like a means to access all areas of the vessel and allow the crew to safely move fore and aft to remove ice, inspect the vessel, and operate critical equipment like the vessel's anchors and similar gear that does not require the crew to climb over the pot stack (for example, in the case of a vessel carrying pots, nets or similar devices to create pathways for access).

8.1.1.4. Examine and make recommendations to the Coast Guard on a way to widely distribute PLBs at minimal expense. Ensure availability and access for crewmembers of these critical lifesaving devices which could be acquired by consortiums, associations, or other organizations for distribution to vessel crews through federally funded grant programs or other programs.

[274] Coast Guard's Report of Investigation into the Sinking of the Fishing Vessel LADY OF GRACE https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/CG-5PC/INV/docs/documents/LadyOfGrace.pdf

8.1.1.5. Establish best practices for standard procedures and guidance for crew standing navigation watches. This should include a detailed crew orientation for each unique vessel, including the operation of critical equipment and establish clear and easily understood watchstanding orders to protect the safety of the vessel for its applicable operations. This could be accomplished as a standardized form or checklist.

8.1.1.6. Evaluate and provide a comprehensive list of recommendations to the Coast Guard, in the form of best practices (NVICs, policies, training), or amended or new regulations, regarding stability considerations which may pose severe risk to the safety of a fishing vessel such as icing, loading, the need for stability instructions, and vessel modifications. As part of this task, review the Coast Guard's current level of oversight, provide recommendations on its adequacy, and specify needed changes to areas of the fishing safety program that need additional attention.

8.1.1.7. Evaluate and provide recommendations to the Coast Guard for best practices to address the high degree of risk associated with fishing vessel operations and how the acceptance of risk is prevalent and accepted in the fishing industry. Specifically, the Marine Board recommends the committee focus on topics including icing, heavy weather avoidance in voyage planning, and formalizing the navigation watch duties via onboard familiarization and written standard orders to ensure the safety of vessel during its transit and during fishing operations.

8.1.1.8. Evaluate and provide recommendations to the Coast Guard to ensure the most effective means to widely disseminate critical safety information for the commercial fishing industry. This Marine Board investigation revealed that current means are not effective at making it to a large portion of the commercial fishing fleet.

8.1.2. Recommend that the Commandant of the Coast Guard clarify the existing language in the requirements contained in 46 CFR 28.270(b)—participation in drills—regarding "donning" immersion suits. The regulatory intent was to have each member of the crew physically put on an immersion suit to satisfy the requirements of the regulation. More importantly, the intent was to get the tactile experience and increase crewmember ability to rapidly and properly don the suit in extreme conditions.

8.1.3. As previously noted in the DESTINATION ROI, recommend that the Commandant of the Coast Guard amend 46 CFR 28.550 - Icing, to clarify that the vessel's stability instructions to the master should indicate that when freezing spray forecasts or conditions exist, the vessel may experience icing conditions that dangerously compromise the vessel's stability and that captains shall consider delaying departure from port, or if already underway, seek protected waters or take immediate action to reduce or mitigate ice accumulations.

8.1.4. Recommend that the Commandant of the Coast Guard, specifically, CG-CVC, collaborate with marine training institutions like the NPFVOA and AMSEA seeking to amend their curriculums as appropriate for operating areas with icing conditions. The effort should increase the focus on the dangers of icing and other potential sources for loss of

stability and provide for recommended best practices to reduce icing or causes of loss of stability. This could include protective measures such as dropping gear overboard when in dangerous stability condition, not getting underway in the face of severe weather, or seeking shelter if already underway.

8.1.5. Recommend that the Commandant of the Coast Guard, specifically the MSC, create a mechanism to track quality related issues pertaining to stability work involving professional engineers/naval architects. Develop a formal mechanism to provide feedback to regulatory bodies overseeing naval architects and professional engineers after identifying deficiencies in the quality of work that affect vessel safety.

8.1.6. Recommend that the Commandant of the Coast Guard, specifically CG-5P and other applicable offices determine the real-life icing effects on commercial fishing vessels, specifically the asymmetrical nature of accumulation on the vessel and pots, and amend 46 CFR 28.550 to improve the margin of safety for vessels operating in such harsh environments. The RDC Ice Accretion on Crab Pots REACT Report is a baseline study and can serve as a starting point for this effort to build more effective regulatory icing standards.

8.1.7. Recommend that the Commandant of the Coast Guard develop regulations that require commercial fishing captains of documented vessels operating beyond the boundary line attend and complete an accepted stability training course. Doing this would align the regulations with the 2010 CGAA which added a subsection in 46 USC §4502 that required an individual in charge of a commercial fishing vessel that operates three NMs beyond the territorial sea baseline to pass a training program and hold a certificate issued under that program.

8.1.8. Similar to the recommendation made in the DESTINATION ROI, recommend that the Commandant of the Coast Guard amend 46 CFR Part 28 to require CFV owners and captains implement vessel policies to address crew rest, work hours and fatigue. Implementing regulations to require fishing vessels to implement vessel policies reflecting the basic principles of the Coast Guard's Crew Endurance Management System (CEMS) or similar practices that can be used to identify and control crew fatigue risk factors.

8.1.9. Recommend that the Commandant of the Coast Guard, specifically, CG-CVC and CG-ENG, promptly produce and disseminate a Marine Safety Information Bulletin or Safety Alert discussing a best marine practice to ensure a means of access to all parts of a fishing vessel, such as an alleyway through the pot stack or along one side of the stack, while the vessel is underway/operational in inclement conditions. In doing so, fishermen will have a safer way to maintain a clearer picture of the materiel and stability condition of their vessel in icing conditions and can take steps to mitigate negative forces before the loss of stability becomes catastrophic. The Coast Guard should collaborate with marine training institutions like the NPFVOA and AMSEA in ensuring widest distribution of this message to the commercial fishing industry.

8.1.10. Recommend that the Commandant of the Coast Guard promote the use of a properly installed and configured Digital Selective Calling feature on marine VHF radios throughout

the maritime regions of the U.S. aboard all vessels, as this will enhance the saving of life and property and the potential timeliness of rescue in marine emergencies. This safety initiative to promote the widespread use of VHF marine radios DSC features should be added to the scope of duties, checklists, and job aids used by Coast Guard personnel and Coast Guard Auxiliarists conducting marine safety related outreach to the marine community, including the recreational boating community.

8.1.11. Recommend that the Commandant of the Coast Guard, specifically CG-CVC in partnership with N-CFSAC, promote and encourage CFV owners and captains to attend training classes in safety and navigation related subjects such as those offered by various training institutions such as the NPFVOA and AMSEA.

8.1.12. Recommend that the Commandant of the Coast Guard, specifically CG-761, examine and close the AIS and R21 coverage gaps that exist in Alaska to ensure the effectiveness of Coast Guard operations as well as meet national security requirements. As efforts to reduce coverage gaps in D17 partially rely on the work of industry partners, it is strongly recommended that Coast Guard initiatives include collaboration with existing industry partners and utilization of already available communications technology, such as the AIS/DSC capabilities of the Marine Exchange of Alaska.

8.1.13. Recommend that the Commandant of the Coast Guard, specifically CG-SAR and PACAREA reexamine SAR readiness and mission response standards to improve chances of recovery. While an abbreviated SAR case study has been conducted by the Coast Guard for this accident, the unique demands and challenges posed by this accident and similar accidents in remote Alaskan waters require that a full scope SAR case study with recommendations for improving Coast Guard rescue operations.

8.1.14. Recommend that the Commandant of the Coast Guard continue outreach efforts to improve dissemination of the message to the maritime community to address the misalignment between state and federal drug laws. It is critical to reinforce the message that the use of dangerous drugs, positive drug tests, or actual impairment may lead to enforcement actions at the state or federal level up to including criminal prosecution.

8.1.15. Recommend that the Commandant of the Coast Guard, specifically CG-5P elicit expertise from marketing and advertising professionals to better disseminate important safety information, such as “A Best Practice Guide to Vessel Stability, Second Edition” which is available on the CG-CVC-3 website. In addition, this knowledge should be implemented to other aspects of the CFVS Program to meet mandates of the Commercial Fishing Vessel Safety National Communications Plan.[275]

8.1.16. Recommend that the Commandant of the Coast Guard, including but not limited to CG-5P and CG-SAR, partner with marine industry to promote the wearing and use of PLBs. Conduct education and outreach to promote availability and benefits that increase chances of

[275] The Commercial Fishing Vessel Safety National Communications Plan is intended to establish a standardized framework of communications that will make sharing and disseminating information between the U.S. Coast Guard and commercial fishing industry easier.

survival and rescue. Such outreach efforts can include developing safety alerts, establishing Coast Guard presence at Maritime Expos or events that draw the maritime community, attending industry workshops, or hosting local industry days with CFV owners, operators, and crew.

8.1.17. Recommend that the Commandant of the Coast Guard, specifically CG-CVC, conduct effective and widespread outreach to educate mariners on abandon ship procedures to ensure proper deployment and device activation of the EPIRB allowing it to transmit the distress alert signal which would result in the receipt of the distress signal by rescue forces.

8.1.18. Recommend that the Commandant of the Coast Guard direct Coast Guard investment in modernizing the VHF land-based assets in D17 to meet Sea Area 1 requirements with special attention to design parameters enabling that communications equipment to handle the extremes of the Alaskan environment. Additionally, the Coast Guard must ensure that the HF radio program remains in place and operational in the D17 AOR to support an effective SAR program.

8.1.19. Recommend that the Commandant of the Coast Guard work with IMO and the liferaft manufacturing industry to examine and consider the improvement of lighting on liferafts and other survival equipment. This would include the use of the newest available lighting technology (i.e. LED lighting, laser flares, and beacons) to increase the range of detection, illumination, reliability of lamps leading to an increased amount of interior/exterior lighting, and increasing the probability of survivability and rescue.

8.1.20. Recommend that the Commandant of the Coast Guard accept and implement the recommendations contained in the SCANDIES ROSE SAR Case Review.

8.1.21. Recommend that the Commandant of the Coast Guard, specifically CG-5PC release a Safety Alert regarding the value gained in properly configuring a marine VHF radio to enable the use of a DSC alert and provide users with the necessary steps configure the DSC function.

8.1.22. Recommend that the Commandant of the Coast Guard direct the appropriate Headquarters office(s) to implement the provisions of the 2010 CGAA and 2012 CGMTA relating to commercial fishing vessels.

8.1.23. It is recommended that the Commandant of the Coast Guard, specifically CG-CVC working with the SCANDIES ROSE Marine Board, develop a user-friendly abbreviated version of this report containing key findings of this report and containing relevant information from the DESTINATION ROI and the RDC's Ice Accretion on Crab Pot Report in text and image form content, where appropriate. This printed and digital guide would be developed for the purpose of widespread distribution to the appropriate segment of the commercial fishing industry (cold water operating environments).

8.2. Administrative Recommendations

8.2.1. In absence of applicable regulations, recommend that the commercial fishing industry voluntarily adopt requirements outlined in 46 CFR Part 57 for the use of certified marine welders when conducting work on steel hull commercial fishing vessels. Use of procedures outlined in the Coast Guard's NVIC 7-68 (Guidelines for steel vessel hull repair) and American Welding Society (AWS) Standards for Welders are accepted best practices to determine that quality repairs have been completed.

8.2.2. Recommend the National Weather Service make forecasting as well as existing models on freezing spray and icing more operationally available and easily accessible to the maritime community. It is critical that the NWS enhance their weather products to incorporate applications such as the experimental freezing spray forecast and create easily accessible, user-friendly interfaces to improve vessel safety.

8.2.3. Recommend the National Weather Service incorporate the data provided by the AIS based weather sensors, maintained by Marine Exchange of Alaska, into the forecasting models for the Alaska region.

8.2.4. Recommend the National Weather Service explore and investigate a means to update the weather message content in all appropriate National Weather Service products to provide an explanation of statements such as "Freezing Spray" and "Heavy Freezing Spray" conditions, providing information that is found in the National Weather Service Glossary, on the potential rate of ice accumulation from freezing spray in inches per hour for each classification of freezing spray. Providing this information facilitates mariners' ability to appropriately manage the risk from freezing spray along their intended route.

8.2.5. Recommend that NOAA and the Marine Exchange of Alaska, in conjunction with any other applicable governmental or non-governmental organizations/stakeholders, enhance partnerships to establish a more extensive network of reliable weather stations in coastal regions to gather more accurate weather information for the transportation industry in the remote regions of Alaska.

8.2.6. Recommend the Federal Communications Commission examine and amend existing regulations where required and revise FCC Public Notice DA 16-63. This change should require any commercial vessel be equipped with a VHF marine radio that has a properly configured DSC feature with an interconnected GPS, MMSI programmed, and ready for immediate use including within the State of Alaska (which is presently excluded) and adjacent waters. The Marine Exchange of Alaska has installed DSC receivers on its AIS towers since the accident, and is continuing to expand that network. These additional DSC receivers would enable receipt of DSC distress alerts and potentially facilitate a reduction in the time it takes for Coast Guard and other rescue forces to reach vessels distress.

8.2.7. Recommend that the State of Alaska implement a new measure in the Alaska Administrative Code, where appropriate, to close the safety gap where crabbers participating in the Bering Sea/Aleutian Islands IFQ Crab Fisheries Management Plan are required to

report to the Coast Guard prior to departing port and vessels with similar gear are not required to report. In Section 5 AAC 39.670 - (7) an operator of a vessel participating in an IFQ, CDQ, or Adak community allocation crab fishery in the Bering Sea/Aleutian Islands area must notify the United States Coast Guard at least 24 hours before departing port when carrying crab pot gear; whereas the same vessel when fishing with modified crab pots of the same size for groundfish and, facing the same vessel stability risks, are not required to make these safety related reports prior to departure.

8.2.8. Recommend that the Washington State Board of Registration for Professional Engineers and Land Surveyors be provided with a copy of this ROI and examine it for information relating to the quality and accuracy of the stability work performed by the P.E./Naval Architect who conducted the stability testing and provided the stability instructions for the SCANDIES ROSE in 1988 and 2019 and continues to conduct stability work on vessels throughout the West Coast.

8.2.9. Recommend that the Commandant of the Coast Guard provide widest dissemination of this report throughout the CFV industry to include:

8.2.9.1. Coast Guard District Fishing Vessel Coordinators

8.2.9.2. To training institutions (AMSEA, NPFVOA, and others) for use as a case study. The purpose is to reach the intended audience of commercial fishing vessel crews, owners, and operators of and communicate the importance of taking timely and effective action at the first sign of emergency, to take action and maximize the chances of survivability for vessel and crew.

8.2.9.3. Major fishing vessel associations in the Pacific Northwest and Alaska.

8.2.9.4. In this case, it is critical that Commandant reach out to the WA State regulating body for naval architects and Professional Engineers.

8.2.10. It is recommended that the participating crews of Air Station Kodiak and the CGC MELLON be commended for their search and rescue efforts after the loss of the SCANDIES ROSE.

8.3. Although not a direct contributing factor to this accident, the investigation revealed the following issues warranted being classified as **Findings of Concern**:

8.3.1. Crew medical conditions that affect performance in the dangerous operations of commercial fishing vessels are not identified and assessed to determine conditions that may affect critical vessel operations. This investigation revealed that a [redacted] person was insulin dependent and the [redacted] had vision, heart, hearing and other medical problems which could have been greatly exacerbated in the challenging maritime environment of Alaska and other similar areas. Owners may attempt to assess fitness for service by the crew but the commercial pressures of fishing operations may preclude management oversight of these risks to vessel operations. In this case, the managing owner was not aware of the scale of

medical issues with the SCANDIES ROSE crew as it departed on the accident voyage. There is no requirement for medical fitness to operate a vessel of the size and type as the SCANDIES ROSE.

8.3.2. One crewmember on the SCANDIES ROSE boarded the vessel and was tested for drugs. It was reported that the results for all five drugs tested in this home drug test kit came back as negative. However, after the rescue, the same crewmember was tested for the same five drugs and the results were positive for marijuana, THC. That crewmember was in a safety sensitive position, operating the SCANDIES ROSE as the navigation watch and stood the last watch on the accident night before the Captain took the watch. It is the opinion of the Marine Board that the initial test for this crewmember was most likely positive but, due to the pressure to get underway with a full complement of crew, the results were reported as negative. In the Marine Board hearing, the owner made the following statement:

> *"Yeah, zero tolerance. Zero tolerance, especially --especially for, you know, meth or opiates. You can't have anything. Nowadays with pot, you almost can't find a crew member who hasn't had some pot, and pot sticks in your system for a long time, but you still have to be -- you know, you just can't have somebody who's showing up on the test. The only exceptions I've ever made is if somebody failed in Seattle, I'd let them ride the boat up and say, you know, we're going to test you again in Kodiak or Dutch Harbor, whenever we get there, and if you don't pass that, you're on a plane coming home."*[276]

Other than post casualty testing, there is no explicit requirement to provide a drug and alcohol free workplace onboard a vessel of the size and type as the SCANDIES ROSE unless the crew have a Coast Guard license or credential.

8.3.3. Fatigue at sea has a dangerous and debilitating effect on decision-making. One of the survivor's work-rest history was analyzed and he was found to be impaired by fatigue to the level of legal intoxication by alcohol. The other deckhands worked together to load the boat and there is the likelihood that they all were at sea for a period where they could not make up the sleep deficit on the voyage to the fishing grounds. It was not possible to accurately assess the fatigue level for the Captain. Despite the uncertainty of fatigue's impact on this accident, research has shown that fatigue leads to errors in decision making and decreased motor skills. There is no requirement for establishing a work routine to reduce the effects of fatigue when operating a vessel of the size and type as the SCANDIES ROSE.

8.3.4. Companies that operate fishing vessels without developed written procedures and have multiple employees and operators may create situations that lead to latent unsafe conditions in terms of misunderstanding the roles and expectations for important duties. It is recommended that companies should consider developing written procedures to operate their vessels safely with due regard to the intended service and fishery of the vessel and ensure that all employees within the company are thoroughly familiar with these policies and procedures.

[276] [redacted], MBI Hearing Transcript, Pg. 78

8.4. Recommend this investigation be closed.

[redacted]

GREGORY A. CALLAGHAN
Captain, U.S. Coast Guard
Chairman, Marine Board of Investigation

Enclosure(s): (1) Marine Board of Investigation Convening Order/Subsequent Changes
(2) SCANDIES ROSE ROI Hyperlinks

Enclosure (2)

List of Hyperlinks for F/V SCANDIES ROSE Report of Investigation

Hyperlink No.	Items	Type	Hyperlink
1	Animation of the SCANDIES ROSE Voyage	.mp4	SCANDIES ROSE Voyage Animation
2	CG Exhibit 085 - Distress call from the SCANDIES ROSE, 1 minute 38 seconds in length	.mp3	SCANDIES ROSE Mayday Call 1 min 38 seconds
3	CG Exhibit 127 - Fish Safe BC Stability Video	.mp4	Fish Safe BC Stability Video
4	CG Exhibit 132 - Pre-Hearing Interview Transcripts	.pdf	NTSB Pre-Hearing Interview Transcripts
5	MBI Hearing Transcripts	.pdf	Combined MBI Hearing Transcripts
6	CG Exhibit 136 - Post-Hearing Interview Transcript	.pdf	Post MBI Hearing Interview, Mr. Lawler
7	MSC Stability Report complete with Appendices	.pdf	MSC Stability Report, Addendum and Appendices A,B and C
8	Coast Guard REACT Ice Accretion on Crab Pots Report	.pdf	RDC's REACT Report "Ice Accretion on Crab Pots"

Note: Hyperlinks 1, 2 and 3 are relatively large files and will take time to load on your browser.