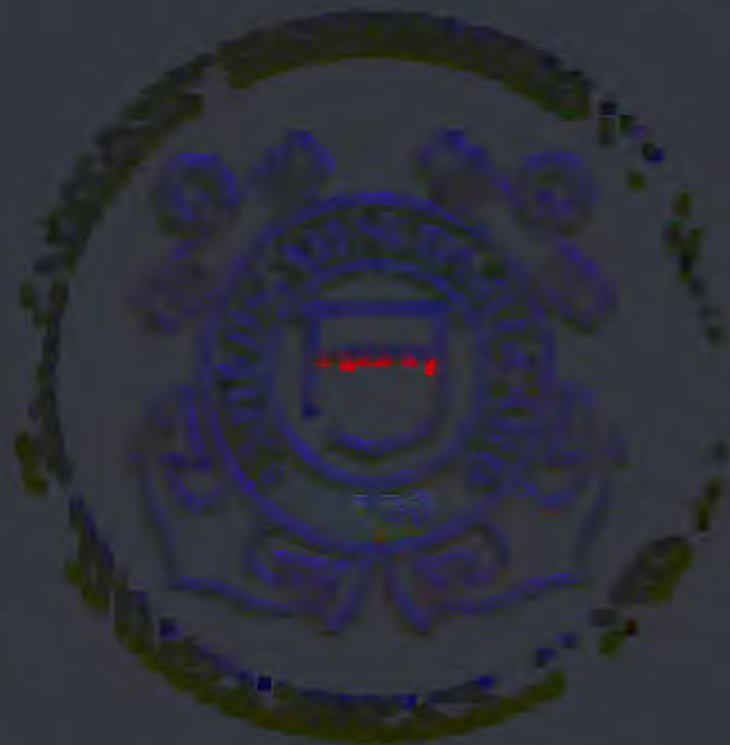


UNITED STATES COAST GUARD

INVESTIGATION INTO THE CIRCUMSTANCES
SURROUNDING THE EXPLOSION, FIRE, AND SINKING OF
THE UNINSPECTED FISH PROCESSING VESSEL

GALAXY

OFFICIAL NUMBER 576981, IN THE BERING SEA ON
OCTOBER 20, 2002, WITH TWO PERSONS DECEASED AND
ONE PERSON MISSING AND PRESUMED DEAD





16732
June 2, 2005

**INVESTIGATION INTO THE CIRCUMSTANCES SURROUNDING THE EXPLOSION,
FIRE, AND SINKING OF THE UNINSPECTED FISH PROCESSING VESSEL GALAXY,
OFFICIAL NUMBER 576981, IN THE BERING SEA ON OCTOBER 20, 2002, WITH TWO
PERSONS DECEASED AND ONE PERSON MISSING AND PRESUMED DEAD**

ACTION BY THE COMMANDANT

The record and the report of the Formal Investigation convened to investigate 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.

COMMENTS ON THE DISTRICT COMMANDER'S ENDORSEMENT

Qualification of the Emergency Drill Conductor – page 116: According to testimony, Mr. [REDACTED] was in charge of conducting safety training, instruction, and drills. A review of training records at the NPFVOA, Fremont Maritime Academy, and Alaska Marine Safety Education Association (AMSEA) indicate that Mr. [REDACTED] was not certificated to conduct this training. Until September 15, 1998, Mr. [REDACTED] license would have allowed him to serve as the drill conductor. However, following this date, all drill conductors needed to attend a U.S. Coast Guard approved course to become a certified drill conductor or be individually approved by the local U.S. Coast Guard Marine Safety Office. While this lack of certification or U.S. Coast Guard approval does not necessarily mean that Mr. [REDACTED] was not competent to conduct and supervise the emergency drills and instruction on board the FPV GALAXY, he was not certificated or approved to do so.

Comment: The District Commander correctly states that 46 CFR 28.270(c) does not specifically require a mariner to attend a Coast Guard approved course or to obtain approval through the local Coast Guard Marine Safety Office to be considered qualified as a fishing vessel drill conductor. The Coast Guard has provided supplemental guidance in Navigation and Vessel Inspection Circular (NVIC) 7-93, *Guidelines for Acceptance of "Fishing Vessel Safety Instructors" and Course Curricula for Training "Fishing Vessel Drill Conductors."* NVIC 7-93 indicates that "to be assured of meeting Coast Guard minimum training requirements of 46 CFR 28.270(c), Fishing Vessel Drill Conductors, who are not licensed for operation of inspected vessels of 100 gross tons or more, must be trained by a Fishing Vessel Safety Instructor" that has been accepted by the local Officer in Charge, Marine Inspection (OCMI).

Recommendation 2: The Officer in Charge Marine Inspection, Western Alaska should initiate an investigation into a possible violation of 46 CFR 28.270(c).

Comment: The District Commander does not concur with this recommendation, stating that this recommendation is based on the regulatory interpretation that all drill conductors need to attend a U.S. Coast Guard approved course to become a certified drill conductor or be individually approved by the local U.S. Coast Guard Marine Safety Office. The District Commander recommends that further guidance and interpretation of 46 CFR 28.270(c) be provided to better define "proper training." We concur with the intent of the District Commander's recommendation. Although Navigation and Vessel Inspection Circular (NVIC) 7-93, *Guidelines for Acceptance of "Fishing Vessel Safety Instructors" and Course Curricula for Training "Fishing Vessel Drill Conductors,"* provides guidance on the training that an individual must have in order to meet the requirements of 46 CFR 28.270(c), we will further consider this issue during our upcoming regulatory project and policy review on fishing vessel safety.

ACTION ON RECOMMENDATIONS

Recommendation 8: The Seventeenth Coast Guard District, along with Coast Guard Headquarters, and representatives from ABS and DNV, should initiate and develop policy guidance to address and clarify existing requirements for manning and watch keeping on board head and gut fishing vessels and fish processing vessels less than 1600 GT. This policy should include, but not be limited to, clearly defining the terms "manned engine space" and "periodically unattended machinery space." Any new policy guidance should complement the statutory and regulatory language defining the term "Watch" as found in 46 USC Chapter 81 and 46 CFR Part 15.

Action: We concur with the intent of this recommendation. While some of these terms and policies are already defined, we agree that there is a need for further action to clarify them and make their application more consistent nationwide. We will move forward with discussions with the Coast Guard's Fishing Vessel Safety Coordinators to develop a plan to improve the consistent application of terms and policies associated with manning and watch keeping on head and gut fishing vessels and fish processing vessels less than 1600 gross tons.

Recommendation 13: In developing future fishery rationalization alternatives for the BSAI/GOA groundfish FMPs involving head and gut vessels, the North Pacific Fishery Management Council should consider utilizing the authority provided in National Standard 10 and recommend that all head and gut vessels which remain in these fisheries following rationalization meet additional safety standards as recommended by the U.S. Coast Guard.

Action: We concur with the intent of this recommendation. As further recommended by the District Commander, we will review the proposal and consult with the Commercial Fishing Industry Vessel Safety Advisory Committee (CFIVSAC) to determine a course of action.

Recommendation 14: In the absence of new regulations, all fish processing vessels and head and gut vessels should voluntarily adopt Recommendations 19-26.

Action: We concur with the intent of this recommendation. A review and revision of Navigation and Vessel Inspection Circular (NVIC) 5-86, *Voluntary Standards for U.S. Uninspected Commercial Fishing Vessels*, will be conducted. As part of that review, we will consider whether those recommendations that do not result in new regulations should be included in the revised NVIC.

Recommendation 15: Safety training organizations approved by the U.S. Coast Guard should develop safety videos and training programs for non-English speaking commercial fishing employees to ensure that all non-English speaking crew members are familiar with their emergency responsibilities and duties.

Action: We concur with this recommendation. We have already had AMSEA prepare training videos in Spanish and Vietnamese. In addition, we will encourage other training organizations to develop versions of their training videos and programs in languages other than English.

Recommendation 16: Commercial fishing vessel owners and operators should provide drill instructor training for lead non-English speaking factory and fish processing personnel to ensure that all non-English speaking crew members are familiar with their emergency responsibilities and duties.

Action: We concur with the intent of this recommendation. We agree that adequate safety training must be provided for all fishing vessel employees, including those not conversant in English. However, since operators must also insure that emergency instructions are understood by all crewmembers, additional measures may be necessary. We will include the issue of crew members' English proficiency and its effect on training and emergency response in our upcoming regulatory project and policy review on fishing vessel safety.

Recommendation 17: Commercial fishing vessel owners and fishing vessel organizations should recommend to the North Pacific Fishery Management Council and National Marine Fisheries Service that head and gut vessels remaining in any future rationalized fisheries meet additional safety standards as recommended by the U.S. Coast Guard.

Action: We concur with the intent of this recommendation. As further recommended by the District Commander, we will review the proposal and consult with the Commercial Fishing Industry Vessel Safety Advisory Committee (CFIVSAC) to determine a course of action.

Recommendation 18: For vessels where it is the policy to notify the master of the vessel prior to discharging the vessel's CO2 system, vessel owners should install an independently powered emergency communication system between the wheelhouse and the CO2 room, to allow immediate emergency notification communication to the wheelhouse.

Action: We concur with the intent of this recommendation. We agree that rapid communication during an emergency is necessary; however, this proposal exceeds the current standards for

inspected vessels. We agree that owners should provide a reliable means of communication between the CO2 room and the wheelhouse.

Recommendation 19: The U.S. Coast Guard should develop regulations, under the provisions of 46 USC 4502(b)(2)(G), for all fishing vessels where an individual liferaft weighs 200 pounds or more, to install liferaft launching arrangements where that raft can be launched by a single person.

Action: We concur with the intent of this recommendation. Stowage and launching arrangements for large liferafts on fishing vessels should allow easy launching. Generally, large liferafts should be stowed so as not to require significant lifting unless mechanical devices are installed to assist in their launch. We will evaluate the feasibility of implementing such requirements for uninspected fishing vessels during our upcoming regulatory project and policy review on fishing vessel safety.

Recommendation 20: The U.S. Coast Guard should develop regulations, under the provisions of 46 USC 4502(b)(2)(G), to require engine room fire detection and monitoring equipment on all new and existing fish processing vessels and head and gut vessels. These detection systems should have monitors or alarms installed in both the wheelhouse and engine room monitoring stations and should be tested monthly.

Action: We partially concur with this recommendation. We agree that fire detection systems should be required for periodically unattended machinery spaces on certain fish processing vessels and head and gut vessels. However, we do not agree that such a requirement should be applied to all existing vessels. We intend to propose regulations to implement this recommendation for new and existing vessels that must comply with 46 CFR 28, Subpart D.

Recommendation 21: The U.S. Coast Guard should develop regulations, under the provisions of 46 USC 4502(b)(2)(G), to require that vessels be equipped with embarkation ladders for each survival craft on board. This is recommended for high-sided head and gut vessels and fish processing vessels where the survival craft or embarking station is located at heights greater than 15 feet above the waterline.

Action: We concur with the intent of this recommendation. We agree that vessels that have high freeboard where the survival craft or embarkation stations are located at heights greater than 15 feet above the waterline need to have arrangements to ensure the safe boarding of survival craft. We note that other regulations require an embarkation ladder where the embarkation station is 10 feet above the waterline. We will further consider this issue during our upcoming regulatory project and policy review on fishing vessel safety.

Recommendation 22: The U.S. Coast Guard should develop regulations, under the provisions of 46 USC 4502(b)(2)(G), to require that all personal marker lights for survival suits be of the strobe variety and be designed so that the user may activate the light with one hand. This recommendation is for all commercial fishing vessels operating in cold waters.

Action: We do not concur with this recommendation. There is no international consensus that strobe lights are more effective than steady lights in all conditions. Both types have long been equally accepted internationally for use on all types of vessels. Strobe lights can cause disorientation and vertigo in the dark, and therefore are required to have manual switches. Steady lights are not required to have manual switches. While the switches must be operable by immersion-suit-gloved hands, there is no requirement that any lights be capable of activation with one hand. We will publish the results of this investigation for light manufacturers to consider in the development and improvement of their products.

Recommendation 23: The U.S. Coast Guard should develop regulations, under the provisions of 46 USC 4502(b)(2)(G), to require that man overboard recovery devices (in addition to liferings) be required on all documented commercial fishing vessels operating beyond the boundary line.

Action: We do not concur with this recommendation. The Coast Guard does not require dedicated man overboard recovery devices other than rescue boats on any commercial vessels. Presently available man overboard recovery devices depend on maneuvering the vessel alongside the person in the water to allow the use of a fixed davit, net, ladder, or other equipment, and likely would have been ineffective under the circumstances of this casualty.

Recommendation 24: The U.S. Coast Guard should develop regulations to require that more than one person on board a commercial fishing vessel be trained as a drill instructor in accordance with 46 CFR 28.270 for crews greater than sixteen people.

Action: We concur with this recommendation. We agree that there needs to be more than one drill conductor when the number of persons on board a fishing vessel exceeds sixteen. We intend to propose regulations that will require one drill conductor for every sixteen, or fraction thereof, persons on board.

Recommendation 25: The U.S. Coast Guard should develop additional safety training practices, guidelines, and recommendations for fire team members on commercial fishing vessels equipped with SCBAs and firemen outfits and for commercial fishing vessels which utilize rescue swimmers.

Action: We concur with this recommendation. A review and revision of Navigation and Vessel Inspection Circular (NVIC) 5-86, *Voluntary Standards for U.S. Uninspected Commercial Fishing Vessels*, will be conducted. As part of that review, we will consider additional safety training practices, guidelines, and recommendations for fire team members on commercial fishing vessels equipped with SCBAs and firemen outfits and for commercial fishing vessels which utilize rescue swimmers.

Recommendation 26: The U.S. Coast Guard should develop regulations requiring vessel owners and naval architects to report significant alterations and major conversions on commercial fishing industry vessels to the U.S. Coast Guard.

Action: We concur with the intent of this recommendation. Existing requirements for notifying the Coast Guard of repairs, alterations or conversions of inspected vessels enable the Coast

Guard to determine the appropriate regulations to apply to the vessel and to ensure that the vessel can be safely operated in the service in which it is employed. In most cases, inspections must be conducted. Since commercial fishing industry vessels are uninspected, it is questionable whether a requirement to report significant alterations and major conversions to the Coast Guard would result in an increase in safety, as we lack the authority to require the vessels to submit to an inspection by the Coast Guard to determine what regulations might apply or whether the vessel can be safely operated following the changes. However, current regulations for commercial fishing industry vessels do address alterations and conversions and how they may affect the applicability of certain regulations. We will further consider this issue during our upcoming regulatory project and policy review on fishing vessel safety.

Recommendation 27: The U.S. Coast Guard, through the International Maritime Organization, should develop regulations to require that liferaft paddles in SOLAS A and SOLAS B rafts be designed of a material suitable for use in life threatening and emergency situations.

Action: We concur with this recommendation. At present, the only specific International Maritime Organization (IMO) requirement for paddles provided in a liferaft is a demonstration that they can be used to maneuver the liferaft a short distance in calm water. We will pursue improvements at the next opportunity to review the IMO requirements for liferafts. In addition, the International Organization for Standardization (ISO) is currently developing an international standard for survival equipment carried in lifeboats, liferafts, and rescue boats. We will propose that the requirements for paddles in this standard take into account use in a seaway and in adverse climatic conditions. In the meantime, we will also share the results of this investigation with suppliers of liferafts and paddles so that they are aware of the difficulties and failures exhibited in this casualty.

Recommendation 28: The U.S. Coast Guard should make technical corrections to 46 CFR 28.265, 46 CFR 28.270, and 46 CFR 28.275 to further clarify and simplify the existing requirements for safety instructions, training, and emergency drills.

Action: We concur with the intent of this recommendation. We will further consider this recommendation during our upcoming regulatory project and policy review on fishing vessel safety.

Recommendation 29: The U.S. Coast Guard should seek legislative authority to provide a new and separate definition of "head and gut fish processing vessel" in 46 USC 2101(11). This new definition should include fishing vessels currently engaged in head and gut processing operations with more than 16 people on board.

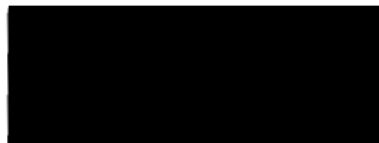
Action: We concur with the intent of this recommendation. We agree that changes in the statutory definitions of fishing vessels could be made to improve safety. We also agree with the comments of the District Commander that the focus should be on the number of persons on board instead of the specific type of operation being conducted. Therefore, we will initiate a legislative and/or regulatory proposal to define and classify vessels based on the number of persons on board.

Recommendation 30: The vessels affected by Recommendation 29 should have additional modest regulations developed to improve standards for evacuation of crew members, fire detection and monitoring equipment, training of crew members and watertight integrity.

Action: We concur with the intent of this recommendation. We believe that the current and planned initiatives described in our responses to the preceding recommendations satisfy the intent of this recommendation.

Recommendation 31: The investigating officer recommends that this casualty investigation be closed.

Action: We concur with this recommendation. This casualty investigation is closed.



W. D. RABE
By direction



16732

**EXPLOSION, FIRE, AND SINKING OF THE CLASSED FISH PROCESSING VESSEL
GALAXY IN THE BERING SEA WITH TWO PERSONS DECEASED AND ONE
PERSON MISSING AND PRESUMED DEAD**

ACTION BY THE DISTRICT COMMANDER

The record and the report of the Formal Investigation convened to investigate the subject casualty have been reviewed. The record and the report, including the description of casualty, analysis, conclusions, and recommendations are approved subject to the following comments.

**COMMENTS ON BERING SEA SEARCH AND RESCUE (SAR) / COMMUNICATIONS
COVER**

Pg 38: In addition to the additional SAR assets available on the fishing grounds, U.S. Coast Guard LORAN Station St. Paul had been conducting a 24 hr VHF radio watch during the red king crab season. This radio watch is not mandated by Seventeenth District policy but was implemented by the current Commanding Officer at LORSTA St. Paul.

Comment: The LORSTA's initiative to stand a 24 hr VHF watch greatly improved the Coast Guard's ability to communicate with the vessel and respond quickly. No other Coast Guard assets were in communications range of the FPV GALAXY at the time of the casualty and if LORSTA had not been maintaining a VHF watch, then our response might have been detrimentally slower. The Bering Sea, as well as other areas throughout Alaska, continually face communication problems due to the large expanse of isolated area of operation and harsh weather conditions. This is just one more example of our need to continually strive to improve communications throughout the Alaska AOR. There are still other areas in Alaskan waters in which we currently do not have the means to quickly communicate with vessels.

COMMENTS ON CASUALTY ANALYSIS

Pg 116: Qualification of the Emergency Drill Conductor: According to testimony, Mr. [REDACTED] was in charge of conducting safety training, instruction, and drills. A review of training records at the NPFVOA, Fremont Maritime Academy, and Alaska Marine Safety Education (AMSEA) indicate that Mr. [REDACTED] was not certified to conduct training. Until September 15, 1998, Mr. [REDACTED] license would have allowed him to serve as drill conductor. However, following this date, all drill conductors needed to attend a U.S. Coast Guard approved course to become a certified drill conductor or be individually approved by the local U.S. Coast Guard Marine Safety Office. While this lack of certification of U.S. Coast Guard approval does not necessarily mean that Mr. [REDACTED] was not competent to conduct and supervise the emergency drills and instruction on board the FPV GALAXY, he was not certified or approved to do so.

Comment: I do not concur that the current regulations require a mariner to specifically attend a U.S. Coast Guard approved course or obtain an approval through the local U.S. Coast Guard Marine Safety Office and be certified to conduct safety training. 46 CFR 28.270 requires

individuals to be properly trained, but does not specifically require the training to be conducted at a U.S. Coast Guard approved course, nor does it require a mariner to obtain an approval through the local U.S. Coast Guard Marine Safety Office. The preamble to this regulation (Federal Register Vol 56, No. 157, Wednesday, August 14, 1991) states there are various ways for a mariner to become properly trained and does not restrict the training to U.S. Coast Guard approved courses. No part of this regulation states that a mariner has to be certified to conduct training. 46 CFR 28.275 are the requirements for instructors teaching course(s) to prospective drill conductors, however I can understand why different entities may interpret these regulations differently. The regulations in 46 CFR 28.270 are not specific in defining the training required for a mariner to be a drill conductor.

COMMENTS ON CONCLUSIONS

Conclusion No. 52, Pg 130: There is sufficient evidence that Captain [REDACTED] did not have a properly qualified drill instructor conducting safety instruction and drills on board the FPV GALAXY, a possible violation of 46 CFR 28.270(c).

Comment: I do not concur, this conclusion is based on the premise that all drill conductors need to attend a U.S. Coast Guard approved course to become a certified drill conductor or be individually approved by the local U.S. Coast Guard Marine Safety Office. As stated in the above comment on casualty analysis, the regulations do not require drill conductors to attend a U.S. Coast Guard approved course or be individually approved by the local U.S. Coast Guard Marine Safety Office. This investigation has not provided substantiated evidence to show that the drill conductor was not properly trained.

ACTION ON RECOMMENDATIONS

Recommendation 1, 3-7: Recommendations to the Marine Safety Office Anchorage.

Action: I concur with these recommendations and with the actions of the Officer in Charge Marine Inspection, Western Alaska.

Recommendation 2: The Officer in Charge Marine Inspection, Western Alaska should initiate an investigation into a possible violation of 46 CFR 28.270(c).

Action: I do not concur with this recommendation. This recommendation is based on the regulatory interpretation that all drill conductors need to attend a U.S. Coast Guard approved course to become a certified drill conductor or be individually approved by the local U.S. Coast Guard Marine Safety Office. As stated in the above comment on casualty analysis, the regulations do not require drill conductors to attend a U.S. Coast Guard approved course or be individually approved by the local U.S. Coast Guard Marine Safety Office. This investigation has not provided substantiated evidence to show that the drill conductor was not properly trained. As I have stated in my comments on Casualty Analysis, I can understand the confusion of interpreting this regulation and recommend G-MOC provide further guidance and interpretation of this regulation which better defines "proper training".

Recommendation 8: The Seventeenth Coast Guard District, along with local representatives from ABS and DNV, should initiate and develop policy guidance to address and clarify existing requirements for manning and watch keeping on board head and gut and fishing vessels and fish processing vessels less than 1600 GT. This policy should include, but not be limited to, clearly defining the terms "manned engine space" and "periodically unattended machinery space". Any new policy guidance should complement the statutory and regulatory language defining the term "Watch" as found in 46 USC Chapter 81 and 46 CFR Part 15.

Action: I concur with the intent of this recommendation. Existing compliance problems need to be first addressed internally before going out to the industry. While we agree a problem does exist, the first step should be for a CG wide Fishing Vessel Coordinator conference to discuss this issue along with other issues and develop a consistent plan of attack on a national level.

Recommendation 9: The Seventeenth Coast Guard District should recognize the extraordinarily brave and heroic efforts of Captain [REDACTED], [REDACTED], [REDACTED] and [REDACTED].

Action: I concur with this recommendation. Award recommendation packages have been submitted to WPM-3: [REDACTED] (Gold Life Saving Medal), [REDACTED] (Gold Life Saving Medal), [REDACTED] (Gold Life Saving Medal), and [REDACTED] (Silver Life Saving Medal).

Recommendation 10: The Seventeenth Coast Guard District should consider providing public service awards to the master and crews of the F/V BLUE PACIFIC, F/V GLACIER BAY, and the F/V CLIPPER EXPRESS.

Action: I concur with this recommendation. Award recommendation packages have been submitted and approved: Captain and Crew F/V GLACIER BAY (Meritorious Public Service Award), Captain and Crew F/V BLUE PACIFIC (Meritorious Public Service Award), and Captain and Crew F/V CLIPPER EXPRESS (Distinguished Public Service Award).

Recommendation 11: The Seventeenth Coast Guard District should develop multiple safety alerts for the lifesaving, fire detection, and fire team response issues which were documented in this investigation.

Action: I concur with this recommendation. MSO Anchorage will be advised to draft safety alerts, coordinating with the unit Fishing Vessel Examiner and forward to D17 Commercial Fishing Vessel Coordinator for approval and dissemination to the industry.

Recommendation 12: The Seventeenth Coast Guard District Office of Search and Rescue (OSR) should direct all rotary wing aircraft with a qualified SAR aircrew on board and all underway major cutters, patrol boats, and buoy tenders to carry automatic external defibrillators (AED).

Action: I concur with the intent of this recommendation. An AED is carried on all Air Station Sitka HH-60s whenever a rescue swimmer is part of the crew makeup (all ready crew flights); the AED is an integral part of this unit's MEDEVAC kit. AEDs are available for use on Air Station Kodiak aircraft, but are only carried at the discretion of the rescue swimmer or corpsman, depending on the mission requirements. Both Station Ketchikan and Station Juneau have one AED each: the AED is normally carried on their 47 foot MLBs when underway with personnel qualified to operate the equipment. The 25 (RBHS) or 27 (UTM) foot boats do not normally carry an AED when underway (primarily due to storage/space constraints). All three D17 WHECs have an AED on board. All D17 patrol boats have an AED on board except for Long Island & Anacapa; D17 (osr) is working with these units to acquire AEDs at no cost through MLCAPAC (k). All D17 buoy tenders have an AED on board except for the Elderberry; D17 (osr) is working with this unit to acquire an AED at no cost through MLCAPAC (k).

Recommendation 13: Recommendation to the North Pacific Fishery Management Council.

Action: I concur with the intent of the recommendation to the North Pacific Fishery Management Council and recommend G-MOC review and provide input to the Vessel Safety Advisory Committee.

Recommendations 14-18: Recommendations to the Commercial Fishing Industry

Action: I concur with the intent of the recommendations to the Commercial Fishing Industry and recommend G-MOC review and provide input to the Vessel Safety Advisory Committee.

Recommendations 19-28: Recommendations to U.S. Coast Guard Headquarters.

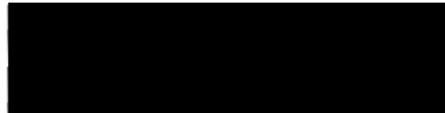
Action: I concur with the intent of the recommendations to U.S. Coast Guard Headquarters and recommend G-MOC review for further action.

Recommendations 29 & 30: Recommendations to U.S. Coast Guard Headquarters.

Action: I concur with the intent of the recommendations to U.S. Coast Guard Headquarters and recommend G-MOC review for further action. Any change of definition/classification of a fishing vessel should be based on the number of persons on board (POB)/lives at risk and not on the type of operation the vessel performs (i.e. removing tails, fins, heads, etc.). The definition/classification should take into account that as the number of POB increases so does the consequences of a casualty increase. A classification based on the number of POB is already in practice as seen with passenger vessels; having increased safety standards for those vessels carrying more passengers – "UPVs", "T-Boats", "K-boats", and "H-boats".

Recommendation 31: The investigating officer recommends that this casualty investigation be closed.

Action: I concur with this recommendation.



J. W. UNDERWOOD
REAR ADMIRAL, U. S. COAST
COMMANDER, SEVENTEENTH COAST GUARD DISTRICT



16732/FPV GALAXY
5 March 2004

**INVESTIGATION INTO THE EXPLOSION, FIRE, AND SINKING OF THE
CLASSIFIED FISH PROCESSING VESSEL GALAXY IN THE BERING SEA WITH
TWO PERSONS DECEASED AND ONE PERSON MISSING AND PRESUMED DEAD**

ACTION BY THE OFFICER IN CHARGE, MARINE INSPECTION WESTERN ALASKA

I have reviewed the record and the report of the Formal Investigation convened to investigate the subject casualty. I agree and concur with the record and the report, including the description of the casualty, analysis, and conclusions found by the Investigating Officer. I have provided commentary for the recommendations for my command. The remaining recommendations within this report are forwarded for your approval.

ACTION ON RECOMMENDATIONS

Recommendation 1: The Officer in Charge Marine Inspection, Western Alaska should initiate an investigation into a possible violation of 46 CFR 28.270 (a).

Action: I do not concur with this recommendation. While the drills conducted on the FPV GALAXY prior to the accident were not sufficient to meet the horrific demands of the actual casualty, there is sufficient evidence that some drills were being conducted. However, due to the lack of well-defined standards by the U.S. Coast Guard at the time of the casualty as to what constitutes an adequate emergency drill, it is extremely difficult to demonstrate a lack of compliance with this regulation. As such, I will not pursue civil penalty actions or suspension and revocation hearings against the master of the FPV GALAXY because I believe that the master was conducting and documenting drills to the level expected at the time by the U.S. Coast Guard and I believe that even if the crew had conducted more thorough drills, the outcome would likely not have changed. However, because of the importance of the intent of this regulation, my office has initiated a comprehensive program, as described in Recommendation 5, to ensure compliance with safety training and emergency drill requirements within the head and gut fishing fleet.

Recommendation 2: The Officer in Charge Marine Inspection, Western Alaska should initiate an investigation into a possible violation of 46 CFR 28.270 (c).

Action: I concur with this recommendation. There was no evidence provided during the hearings or discovered upon further analysis that the Chief Mate was authorized to conduct emergency drills in accordance with 46 CFR 28.270 (c). I intend to initiate a separate investigation into the possible violation of this regulation.

Recommendation 3: The Officer in Charge Marine Inspection, Western Alaska should initiate an investigation into a possible violation of 46 CFR 15.810 (c).

Action: I concur with this recommendation. The license of the Chief Mate expired five days prior to the explosion on the FPV GALAXY. During the analysis of this casualty, it was determined that a license renewal package was never submitted to the U.S. Coast Guard. While the expiration of the license had nothing to do with the explosion or the ensuing casualty, the vessel owner should not have employed a Chief Mate whose license was going to expire during the intended voyage. I intend to initiate a separate investigation into the possible violation of this regulation.

Recommendation 4: The Officer in Charge Marine Inspection, Western Alaska should initiate an investigation into a possible violation of 46 CFR 15.825 (a).

Action: I do not concur with this recommendation. While there is evidence that a violation of this regulation may have occurred, it remains unclear to me whether a licensed assistant engineer is required on fishing and fish processing vessels less than 1600 gross tons. Additionally, there is widespread evidence that most head and gut vessels operating in the Bering Sea / Aleutian Island (BSAI) and Gulf of Alaska (GOA) groundfish fisheries are not currently operating with a licensed assistant engineer and that numerous Coast Guard units have been issuing commercial fishing vessel safety decals to these vessels without requiring a licensed assistant engineer. I strongly recommend that the Seventeenth Coast Guard District and Coast Guard Headquarters concur with Recommendation 8 of this report to develop policy guidance to address this matter.

Recommendation 5: Marine Safety Office Anchorage, along with the North Pacific Fishing Vessel Owners Association, should develop a Task Force to address existing compliance problems in the safety training, instruction and drills for the head and gut and fleets of Alaska and Washington.


Action: I concur with this recommendation. In January 2004 Marine Safety Office Anchorage has initiated a comprehensive training and drill enforcement program targeting the head and gut processing fleet operating in the BSAI / GOA groundfish fisheries. The concept of operations for this program is provided as enclosure (2). To date, fully one third of the fleet has been required to demonstrate full compliance with the provisions of 46 CFR 28.270. A full report of this operation will be completed and submitted to the Seventeenth Coast Guard District no later than July 15, 2004.

Recommendation 6: Copies of this report should be provided to owner of the FPV GALAXY, Captain [REDACTED], Mr. [REDACTED], the families of the deceased, the Commercial Fishing Industry Safety Advisory Committee, and the Executive Director of the North Pacific Fishery Management Council.

Action: I concur with this recommendation and will ensure that copies are provided to all named parties.

Recommendation 7: This report should be given wide dissemination throughout the North Pacific commercial fishing industry including the National Marine Fisheries Service observer program, various fishery news organizations, the North Pacific Fishing Vessel Owner's Association, the Alaska Marine Safety Education Association, the Groundfish Forum, and the North Pacific Longline Association.

Action: I concur with this recommendation. Immediately following the release of this report, the Investigating Officer will hold numerous presentations for commercial fishermen, safety experts, and other interested parties in Seattle, WA, Anchorage, AK and other communities to discuss the findings of this investigation.



Captain, U. S. Coast Guard
Officer In Charge, Marine Inspection
Western Alaska

- Encl: (1) Report for the Formal Investigation into the Explosion, Fire, and Sinking of the Classed Fish Processing Vessel GALAXY in the Bering Sea with Two Persons Deceased and One Person Missing and Presumed Dead
- (2) Comprehensive Verification Strategy for Emergency Drills on the Bering Sea / Aleutian Island and Gulf of Alaska Head and Gut Processing Fleet

Marine Safety Office Anchorage Emergency Drills Evaluation Form

Vessel Name: _____

ON: _____

Gross Tonnage: _____

Length: _____

Loadline Issued By? (If applicable): _____

Classed By? _____

Total Crew Size: _____

Processors: _____

Summary of Licensed Crew

Captain

Yes No

Chief mate

Yes No

Chief Engineer

Yes No

Assistant Engineer

Yes No

Emergency Drill Practices and Documentation

Person with Drill Conductor Card in Crew?

Yes No

Card Issued by: _____

Date of Issue: _____

Does vessel safety orientation?

Yes No

Does vessel log safety training?

Yes No

Does vessel log emergency drills?

Yes No

Is Observer involved in drills?

Yes No

How often does vessel conduct drills? _____

Safety Reminder

Has a securite broadcast been issued?

Yes No

Has the master and crew members been notified of safety procedures to be followed during drills? (No charged hoses, no persons in water, no running)

Yes No

Drills performed satisfactorily: Yes ____ No ____

Enclosure (2)

Marine Safety Office Anchorage Emergency Drills Evaluation Form

Pre-Fire Drill Evaluation (Non-Engine Room Fire)

Does the vessel have a fire main?	Yes	No	
Are hose stations properly equipped?	Yes	No	
Does the vessel have a portable fire pump?	Yes	No	
Does the vessel have firemen outfits?	Yes	No	How many? _____
Does the vessel have an SCBA's and spare bottles?	Yes	No	How many? _____

Fire Drill (Non-Engine Room Fire)

Location & source of fire? _____

Was smoke detected by crew member?	Yes	No	N/A
Did crew member take initial action with a portable fire extinguisher?	Yes	No	N/A
Did crew member secure space?	Yes	No	N/A
Did crew member notify others?	Yes	No	N/A
Did master sound fire alarm and notify crew?	Yes	No	N/A
Does the master initiate a MAYDAY or other appropriate notification?	Yes	No	N/A
Did fire team respond to location in a timely manner?	Yes	No	N/A
Did fire team don appropriate safety equipment?	Yes	No	N/A
Did fire team effectively use tether line?	Yes	No	N/A
Did fire team effectively use hose and nozzles?	Yes	No	N/A
Did fire team effectively use portable extinguishers?	Yes	No	N/A
Did fire team use portable pump?	Yes	No	N/A
Was suction hose long enough?	Yes	No	N/A
Did fire team set fire boundaries?	Yes	No	N/A
Did fire team secure electricity?	Yes	No	N/A
Did fire team secure ventilation?	Yes	No	N/A
Did fire team effectively set fire watch?	Yes	No	N/A
Did fire team effectively communicate with bridge?	Yes	No	N/A
What method of comms was used?	Radio	Messenger	
Did non-emergency team members quickly evacuate to appropriate muster station?	Yes	No	N/A
Did evacuating personnel bring survival suits?	Yes	No	N/A
Were muster sheets available and used immediately?	Yes	No	N/A

Drills performed satisfactorily: Yes ____ No ____

Enclosure (2)

Marine Safety Office Anchorage Emergency Drills Evaluation Form

Pre-Fire Drill Evaluation (Engine Room Fire)

What is vessel's main space fire doctrine?

Does vessel have a USCG approved fixed fire fighting system in E/R?	Yes	No	
Does the vessel have a fire main?	Yes	No	
Are hose stations properly equipped?	Yes	No	
Does engine room have fire dampers?	Yes	No	
Does the vessel have firemen outfits?	Yes	No	How many? _____
Does the vessel have SCBA's and spare bottles?	Yes	No	How many? _____

Fire Drill (Engine Room Fire)

Was smoke detected by crew member?	Yes	No	N/A
Did crew member take initial action with a portable fire extinguisher?	Yes	No	N/A
Did crew member secure space?	Yes	No	N/A
Did crew member notify others?	Yes	No	N/A
Did master sound fire alarm and notify crew?	Yes	No	N/A
Does the master initiate a MAYDAY or other appropriate notification?	Yes	No	N/A
Did fire team respond to location in a timely manner?	Yes	No	N/A
Did fire team don appropriate safety equipment?	Yes	No	N/A
Did fire team secure electricity?	Yes	No	N/A
Did fire team secure engine room ventilation?	Yes	No	N/A
Did fire team install fire dampers?	Yes	No	N/A
Did fire team shut off fuel to space?	Yes	No	N/A
Did engineer notify bridge of intention to use fixed CO2?	Yes	No	N/A
Does fire team recognize sound of CO2 alarm?	Yes	No	N/A
Did fire team set fire boundaries?	Yes	No	N/A
Did fire team effectively set fire watch?	Yes	No	N/A
Did fire team effectively communicate with bridge?	Yes	No	N/A
What method of comms was used?	Radio	Messenger	
Did non-emergency team members quickly evacuate to appropriate muster station?	Yes	No	N/A
Did evacuating personnel bring survival suits?	Yes	No	N/A
Were muster sheets available and used immediately?	Yes	No	N/A

Drills performed satisfactorily: Yes _____ No _____

Enclosure (2)

Marine Safety Office Anchorage Emergency Drills Evaluation Form

Pre-Flooding Drill Evaluation

Does vessel have a portable damage control kit?	Yes	No
Is damage control kit sufficient for the size of the vessel?	Yes	No
Does the vessel have a portable bilge pump?	Yes	No
Is suction hose equipped with an adequate strainer?	Yes	No

Flooding Drill

Location & source of flooding?	<hr/>		
Was flooding detected by crew member?	Yes	No	N/A
Did crew member notify others?	Yes	No	N/A
Did crew member secure space?	Yes	No	N/A
Were all watertight doors secured?	Yes	No	N/A
Did master sound alarm and notify crew?	Yes	No	N/A
Does the master initiate a MAYDAY or other appropriate notification?	Yes	No	N/A
Did damage control team respond to location in a timely manner?	Yes	No	N/A
Did damage control team bring DC kit?	Yes	No	N/A
Did damage control team bring portable pump?	Yes	No	N/A
Was suction hose long enough to reach flooded area?	Yes	No	N/A
Was discharge hose long enough to safely dewater enough space?	Yes	No	N/A
Did damage control team effectively communicate with bridge?	Yes	No	N/A
What method of comms was used?	Radio	Messenger	
Did non-emergency team members quickly evacuate to appropriate muster station?	Yes	No	N/A
Did evacuating personnel bring survival suits?	Yes	No	N/A
Were muster sheets available and used immediately?	Yes	No	N/A

Drills performed satisfactorily: Yes ____ No ____

Enclosure (2)

Marine Safety Office Anchorage Emergency Drills Evaluation Form

Pre-Abandon Ship Drill Evaluation

Are survival suits stowed in proximate locations to the embarkation point?	Yes	No
Are the liferafts stowed in proximate locations to the embarkation point?	Yes	No
Are there sufficient cut aways to launch the rafts through the rails??	Yes	No
Can the life rafts be launched by one person?	Yes	No
Is there an embarkation ladder?	Yes	No

Abandon Ship Drill

Does the master initiate the abandon ship signal?	Yes	No	N/A
Does the master initiate a MAYDAY or other appropriate notification?	Yes	No	N/A
Do all crew members arrive at the abandon ship muster station quickly?	Yes	No	N/A
Do crew members bring the flares?	Yes	No	N/A
Do crew members bring the SARTS?	Yes	No	N/A
Do crew members bring the EPIRB?	Yes	No	N/A
Do crew members bring extra water or food?	Yes	No	N/A
Do all crew members immediately put on their survival suits?	Yes	No	N/A
Do crew members remove hats and draw string sweatshirts?	Yes	No	N/A
Do crew members utilize plastic bags to don their suits?	Yes	No	N/A
Do crew members don their suits properly within 60 seconds?	Yes	No	N/A
Do all suits fit properly?	Yes	No	N/A
If no, how many don't fit properly? _____			
Do the raft launching teams launch the raft and then put on their suits?	Yes	No	N/A
Does the launching team know how to launch the raft?	Yes	No	N/A
Does someone take a muster to account for all crew members?	Yes	No	N/A
Does someone deploy the embarkation ladder?	Yes	No	N/A
Does the Coast Guard Drill Conductor discuss how to safely evacuate the boat?	Yes	No	N/A
Does the Coast Guard Drill Conductor discuss the use of a buoyant quoit?	Yes	No	N/A

Drills performed satisfactorily: Yes ____ No ____

Enclosure (2)

Marine Safety Office Anchorage Emergency Drills Evaluation Form

Pre-Man Overboard Drill

Is vessel equipped to provide rescue swimmer?	Yes	No	N/A
Has rescue swimmer been in the water before with suit on?	Yes	No	N/A
Does vessel have a system in place to recover the person out of the water?	Yes	No	N/A
Is some one on the crew specifically designated to throw ring buoys overboard?	Yes	No	N/A
Does the vessel have smoke flares pre-positioned to mark the victims location?	Yes	No	N/A

Man Overboard Drill

Does the person discovering the emergency alert the crew?	Yes	No	N/A
Does the person call out which side of the vessel the victim fell off?	Yes	No	N/A
Does the master initiate a MOB alarm?	Yes	No	N/A
Do the crew members respond iaw their emergency assignments?	Yes	No	N/A
Does the master use an electronic fix to relocate the victim?	Yes	No	N/A
Do the crew members throw over buoys and other items to mark where to search?	Yes	No	N/A
How long does it take to rig the recover device?	Yes	No	N/A
Does the rescue swimmer immediately get into his suit?	Yes	No	N/A
Is the rescue suit equipped with a harness or simply a rope?	Yes	No	N/A
How long until the victim is "recovered"?	Yes	No	N/A
Does the crew bring blankets?	Yes	No	N/A
Does the crew initiate actions to treat for hypothermia?	Yes	No	N/A

Drills performed satisfactorily: Yes ____ No ____

Enclosure (2)

Marine Safety Office Anchorage Emergency Drills Evaluation Form

FIRE DRILL:

DEWATERING DRILL:

ABANDON SHIP DRILL:

MAN OVERBOARD DRILL:

GENERAL COMMENTS:

Vessel Name: _____

CFVS examiners signature: _____ Date: _____

Drills performed satisfactorily: Yes ____ No ____

Enclosure (2)

From: Investigating Officer, Marine Safety Office Anchorage
To: Commander (d), Seventeenth Coast Guard District
Via: Commanding Officer, Marine Safety Office Anchorage

Subj: CLASSED FISH PROCESSING VESSEL GALAXY (D576981) EXPLOSION,
FIRE AND SINKING IN THE BERING SEA WITH TWO PERSONS DECEASED
AND ONE PERSON MISSING AND PRESUMED DEAD

1. EXECUTIVE SUMMARY

On October 20, 2002, the fish processing vessel (FPV) GALAXY, a freezer longliner, was proceeding at 11 knots on a heading of 270 degrees, approximately 30-35 miles Southwest of St. Paul Island to retrieve long line gear in the Bering Sea. The winds were out of the North-Northeast at 20 - 30 knots and the seas were 15 - 20 feet. The air temperature was 35 degrees Fahrenheit (F) and the water temperature was 43F degrees. At approximately 1622 local time, crew members sighted smoke on multiple decks within the vessel's superstructure and the vessel's captain, Dave Shoemaker, was immediately notified. He activated the fire alarm and the vessel's fire teams responded to the starboard side upper engine room hatch, from where black smoke was pouring. Non-essential crew members evacuated to the aft top deck and the forward main deck while the fire team remained on scene.

The vessel's Chief Mate and a fire team leader, Mr. [REDACTED], believing the vessel's fixed carbon dioxide system had been discharged, ordered several crew members to open multiple exterior watertight hatches to ventilate the smoke from the space in which he and the remaining fire team members were standing. Approximately one minute following this action, a large backdraft explosion occurred, causing the 180-foot vessel to shudder violently. The pressure from the explosion ejected the fire team through the gear setting hatch and into the water. None of the three were wearing survival suits. The crew members who had evacuated to the aft top deck saw the fire team being ejected and began throwing lines and buoys to them. Two of the three crew members were recovered immediately. The remaining man in the water, Mr. Stephens, though conscious, appeared to be injured and began to drift along the starboard side from the stern towards the bow.

One of the four crew members who had evacuated to the forward main deck, Mr. [REDACTED], was the vessel's designated rescue swimmer. He had already donned his survival suit and jumped into the 43F degree water with a ring buoy and safety line to rescue Mr. [REDACTED]. Although Mr. [REDACTED] was able to swim through the 15 - 20 foot seas and racing current to Mr. Stephens, Mr. Stephens was not able to assist in his own rescue. Mr. [REDACTED] was in the water approximately 10 - 15 minutes attempting to rescue Mr. [REDACTED] but Mr. [REDACTED] expired and slipped away from his grasp. During this attempted rescue three key events occurred:

- Captain [REDACTED] successfully transmitted a MAYDAY call to U.S. Coast Guard LORAN Station St. Paul, severely burning his right arm in the process.
- Captain [REDACTED] and several other crew members successfully launched the starboard side liferaft from the top deck.
- A huge fireball exploded from the engine room vents and accommodation hatches located on the forward bulkhead of the wheelhouse, setting the wheelhouse on fire. The fireball separated the 21 crew members on the aft top deck from the four crew members on the forward main deck and separated those 21 crew members from their survival suits.

After the failed rescue of Mr. [REDACTED] Mr. [REDACTED] swam aft to the liferaft, but was exhausted and could not climb into it under his own power. Mr. [REDACTED], the Chief Engineer, jumped from the forward main deck (wearing a survival suit) into the liferaft and pulled Mr. [REDACTED] into the liferaft. The crew members on the aft top deck then maneuvered the raft to the stern using the raft's sea painter (the line which connects the liferaft to the vessel). While the raft was being maneuvered aft, Captain [REDACTED] fell 20 feet from the top of the wheelhouse onto the forward main deck while trying to retrieve additional survival suits from the crew on the forward main deck. During the fall he received additional burns and broke several ribs. Following Captain [REDACTED] fall, Mr. [REDACTED] directed the abandonment of the vessel from the raft, which was 35 - 50 feet below the level of the aft top deck. The crew members on the aft top deck evacuated the vessel in the following manner:

- 12 crew members (three in survival suits and nine without) successfully abandoned the vessel by jumping into the liferaft. An unknown crew member cut the raft's sea painter with a knife and the raft floated free from the vessel. The F/V GLACIER BAY recovered the raft without incident approximately 1.5 – 2 hours later.
- Two crew members unsuccessfully attempted to abandon ship into the raft. Mr. [REDACTED] (wearing a survival suit) attempted to jump into the liferaft, but fell into the water and was not recovered. Mr. [REDACTED] (no survival suit) unsuccessfully attempted to lower himself down the side of the vessel into the raft. The F/V CLIPPER EXPRESS recovered Mr. [REDACTED] out of the water approximately 1.5 – 2 hours later without a pulse.
- Mr. [REDACTED] (wearing a survival suit) and Ms. [REDACTED], a National Marine Fisheries Service observer, (no survival suit) jumped into the water and were recovered alive approximately 1.5 - 2 hours later by the F/V CLIPPER EXPRESS.
- Three crew members (none wearing survival suits) on aft top deck were rescued by U.S. Coast Guard helicopter CG6021.

The remaining four crew members on the forward main deck, all wearing survival suits, were rescued as follows:

- One abandoned the vessel by jumping into the liferaft as it floated past the bow of the FPV GALAXY.
- One abandoned the vessel into the water and was recovered by the F/V BLUE PACIFIC within approximately five minutes of entering the water.
- Two on the bow were rescued by U.S. Coast Guard helicopter CG6021.

A subsequent three-day search at sea by the U.S. Coast Guard did not locate Mr. [REDACTED] or the FPV GALAXY. The FPV GALAXY is presumed to have sunk on October 22, 2002. On June 9, 2003, the remains of Mr. [REDACTED] were discovered on the north eastern shore of Tanaga Island, approximately 450 miles away from where he was last seen alive. The remains were identified through dental records by the Alaska State Troopers. On June 12, 2003 a survival suit from the FPV GALAXY was found a quarter mile away from where Mr. [REDACTED] remains had been discovered. Mr. [REDACTED] is missing and is presumed dead.

2. VESSEL PARTICULARS

Name	GALAXY
Official Number	D576981
Service	Fish Processing Vessel / Freezer Longliner
Document Endorsements	Registry, Coastwise, Fishery
Gross / Net / ITC Tonnage	1327
Registered Length, Breadth & Depth	170.5' x 38.1' x 15.7'
Place Constructed	Wheeling, West Virginia
Year Built	1942
Hull Material	Steel
Place Converted	Seattle, Washington
Year Converted	1997
Propulsion	Twin Diesel 398 Twelve Cylinder Caterpillar
Horsepower	850 BHP Each / 1700 BPH Combined
Market Value	\$ 9,400,000
Replacement Value	\$14,000,000
Homeport	Seattle, Washington
Certificate of Class Issued	18 November 1999 by ABS
Loadline Issued	23 December 1999 by ABS
Last Drydock	July 2002
CFVSE Certificate of Compliance Issued	July 2002 by ABS
Port Issued	Seattle, Washington
Inspection Office	Marine Safety Office Puget Sound

Owner	Galaxy Fisheries LLC 5470 Shilshole Avenue, N.W., Suite 500 Seattle, WA 98107	
Operator	Galaxy Fisheries LLC 5470 Shilshole Avenue, N.W., Suite 500 Seattle, WA 98107	
Master	[REDACTED]	
Master's License	Near Coastal Steam or Motor Vessel < 100 GT Near Coastal Uninspected Fishing Industry Vessels < 1600 GT	
Issued	May 29, 1998	Seattle, WA
Chief Mate	[REDACTED]	
Mate's License	Near Coastal Uninspected Fishing Industry Vessels < 1600 GT	
Issued	October 15, 1997	Seattle, WA
Expired	October 15, 2002	
Chief Engineer	[REDACTED]	
Chief Engineers License	Uninspected Fishing Industry Vessels < 3000 HP	
Issued	June 4, 2001	Seattle, WA
Assistant Engineer License	[REDACTED] None	
Issued	N/A	

3. CREW MEMBER INFORMATION

Name: [REDACTED]
Position: Captain
Hired by Galaxy LLC: 01/01/1998
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English

Name: [REDACTED]
Position: Chief Engineer
Hired by Galaxy LLC: 02/16/2000
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English / Spanish

Name: [REDACTED]
Position: Chief Mate
Hired by Galaxy LLC: 10/18/2000
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English
Next of Kin: [REDACTED]

Name: [REDACTED]
Position: Assistant Engineer
Hired by Galaxy LLC: 01/01/1998
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Polish

Name: [REDACTED]
Position: Deck Boss
Hired by Galaxy LLC: 01/19/1998
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English

Name: [REDACTED]
Position: Assistant Deck Boss
Hired by Galaxy LLC: 09/03/1999
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English

Name: [REDACTED]
Position: Deckhand
Hired by Galaxy LLC: 08/01/2002
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English

Name: [REDACTED]
Position: Deckhand
Hired by Galaxy LLC: 09/03/1999
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Combi
Hired by Galaxy LLC: 08/01/2002
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Deckhand
Hired by Galaxy LLC: 08/17/2000
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English

Name: [REDACTED]
Position: Deckhand
Hired by Galaxy LLC: 10/20/2001
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English

Name: [REDACTED]
Position: Factory Manager
Hired by Galaxy LLC: 09/03/1999
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Assistant Factory Manager
Hired by Galaxy LLC: 12/31/1998
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Processor
Hired by Galaxy LLC: 12/27/2001
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Processor
Hired by Galaxy LLC: 02/22/2002
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Processor
Hired by Galaxy LLC: 08/01/2002
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Processor
Hired by Galaxy LLC: 12/26/2000
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Processor
Hired by Galaxy LLC: 08/01/2002
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English

Name: [REDACTED]
Position: Processor
Hired by Galaxy LLC: 02/22/2002
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Processor
Hired by Galaxy LLC: 12/21/1999
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Processor
Hired by Galaxy LLC: 10/09/2001
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish
Next of Kin: [REDACTED]

Name: [REDACTED]
Position: Processor
Hired by Galaxy LLC: 09/14/1998
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English

Name: [REDACTED]
Position: Processor
Hired by Galaxy LLC: 08/01/2002
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: Spanish

Name: [REDACTED]
Position: Lead Cook
Hired by Galaxy LLC: 06/12/2002
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English
Next of Kin: [REDACTED]

Name: [REDACTED]
Position: Assistant Cook
Hired by Galaxy LLC: 11/02/1998
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English

Name: [REDACTED]
Position: National Marine Fisheries Service Observer
Date Deployed to Galaxy: 10/12/2002
DOB: [REDACTED]
Residence: [REDACTED]
Primary Language: English

4. VESSEL DESCRIPTION

a. History: The FPV GALAXY was originally constructed in 1942 in Wheeling, West Virginia as a mine layer for the U.S. Navy. Since her construction, she served as a military vessel (ex: *Colonel John Storey*, *Barricade*, *ACM-3*, *WAGL-328*) for 29 years. In her most recent military service, she was the U. S. Coast Guard Cutter (USCGC) MAGNOLIA, a 188 foot ocean going buoy tender. She was decommissioned in 1971. In 1976 she was converted by Marine Industries Northwest to a salmon and crab processing vessel for those fisheries in Alaska. The vessel was owned by Dutch Harbor Seafoods from 1976 until 1997. For most of the last decade the vessel was moored at the Galaxy Dock in Dutch Harbor. In 1997, the vessel was taken out of service as a crab processor and sailed to Seattle, Washington.

b. Crab Processor to Freezer Longliner Conversion: In August 1997, the vessel was purchased by the current owner, Galaxy Fisheries, Limited Liability Corporation (LLC) and converted to a freezer longliner. The vessel had four key characteristics about its design and operations which needed to be changed to convert it to a freezer longliner. The following is a brief summary of those characteristics and changes.

- Area of Operations: As a crab processor, most operations occurred in protected waters of the Aleutian Islands. A second rudder was added, and the vessel's hull needed to be altered and weight added in order to operate as an offshore freezer longliner.
- Reductions in Accommodations: The average crew size of the FPV GALAXY as a crab processor was approximately 75 people. A typical freezer longliner has a crew of approximately 25 people. The new owner converted accommodation spaces on the work deck and installed longline fishing gear. These alterations are described in the following paragraph.
- Fishing Gear: As a crab processor, the FPV GALAXY received delivery of crab from other vessels. It did not set or haul its own gear. To convert the vessel to a longliner, the starboard side of the vessel on the work deck was significantly altered. Accommodations were removed and a gear hauling station, gear line, and a gear setting station were installed.
- Processing Equipment: As a crab processor, the processing deck had highly specialized equipment to butcher, clean, cook, and package the crab into boxed clusters of crab legs. This processing equipment, including the boilers, was removed and replaced with processing lines for Pacific cod.

The freezer deck, consisting of the engine room, refrigeration space, and cargo holds were not affected by the conversion. The weather decks, wheelhouse, pilot house deck, and interior main deck also were not affected by the conversion. Following the conversion, the FPV GALAXY was classed and loadlined by the U.S. Coast Guard and the American Bureau of Shipping (ABS) in accordance with Title 46, Code of Federal Regulations (CFR), Part 28 and by 46 CFR Subchapter E. Figure (1) on the following page is a photo taken in 2001 of the FPV GALAXY as a freezer longliner.

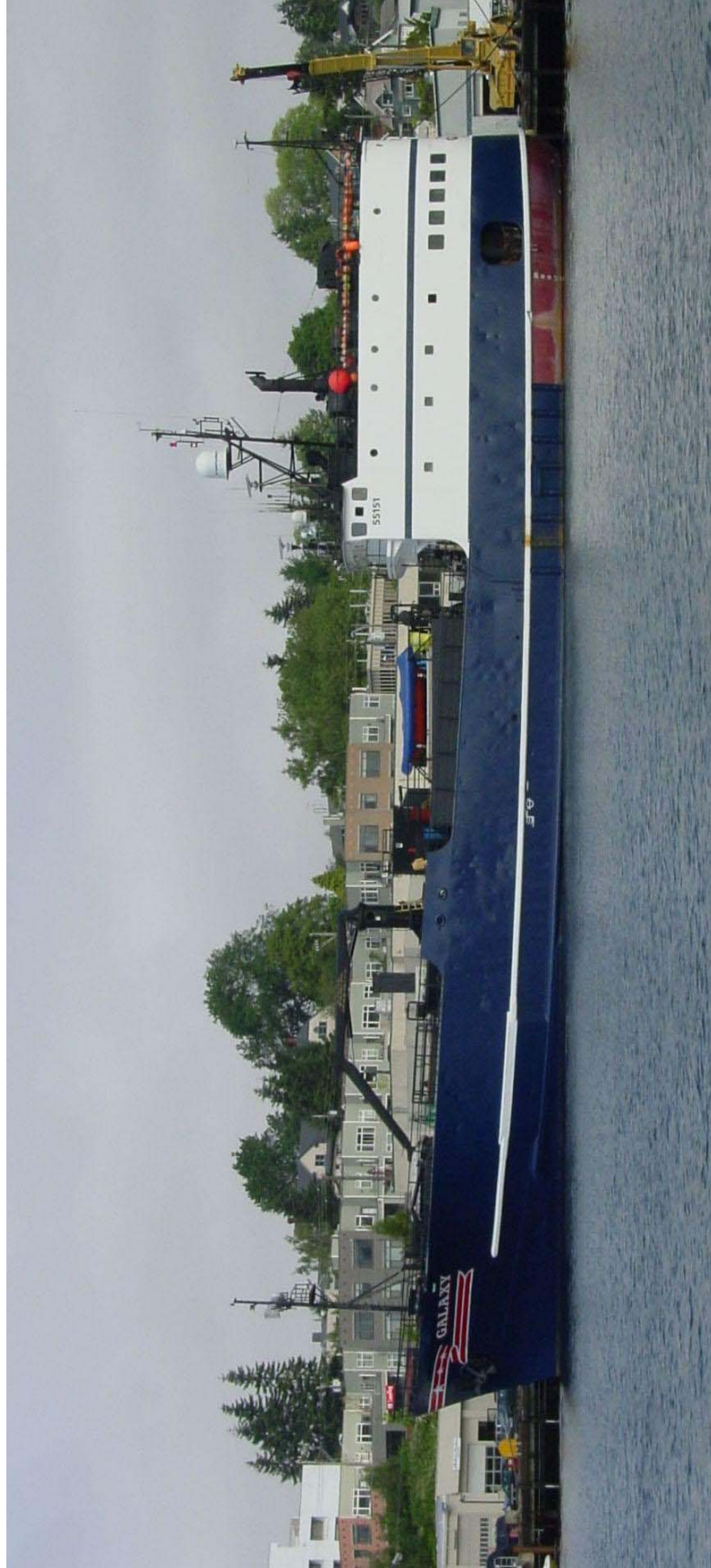


Figure (1): Port Side Profile of FPV GALAXY

c. Current Description: At the time of the casualty, the FPV GALAXY was a 180 foot Washington-based distant water freezer longliner engaged in the Bering Sea/Aleutian Islands (BSAI) groundfish fisheries. In regulatory terms, the FPV GALAXY was a documented fish processing vessel which operated beyond the boundary line. It was steel hulled, twin screw, twin rudder, schooner style (house aft) with a characteristic starboard side gear hauling station located under the forward main deck and a second hatch on the stern of the vessel for gear setting. The vessel's processing operations on her last voyage *did not* meet the regulatory definition of a "fish processing vessel" as defined in 46 CFR Part 28.50, however she was equipped to be a fish processing vessel and was certificated and classed accordingly. The following sections (d-l) provide a detailed description of the vessel, its spaces, and equipment.¹

d. Construction: The vessel had four decks divided into 90 frames from the rudderpost. The vessel's hull was framed and welded with 3/8" mild steel plate with a steel house of 3/8" and 1/4" mild steel plate. The deck plating was 3/8" mild steel plate. The frames were generally 3" x 2" angled steel bar on 22" centers. The tanks and voids were limbered.

e. Tank Level: Figure (2) and Figure (3) on the following pages depicts the tank arrangements and the vessel's profile respectively. The vessel's total fuel capacity was approximately 53145 gallons. The fills for the fuel tanks were located on the forward main deck immediately forward of the wheelhouse.

A summary description of the vessel's tank arrangement is provided in Table 1.

Frame Number	Description	Volume
1-2	Lazarette	N/A
2-6	#2 Potable Water	Unk
7-15	Void (Potable Water Center Line)	Unk
15-24	Engine Room	N/A
24-43	Fuel #5 Port and Starboard Double Bottom	13,564 Gallons
44-55	Fuel #4 Port and Starboard Double Bottom	10,820 Gallons
55-78	Fuel #3 Port and Starboard Double Bottom	12,266 Gallons
78-87	Fuel #2 Deep Tank	14,747 Gallons
87-90	Void	N/A
24-27	Lube Oil Tank	1,616 Gallons
16-18	Port Fuel Oil Daytank	874 Gallons
16-18	Starboard Fuel Oil Daytank	874 Gallons

Table (1): Tank Arrangement and Descriptions

¹ A significant portion of the written description of the vessel in Chapter 4 of this report, including photographs and diagrams, was provided to the U.S. Coast Guard from Mr. [REDACTED] of Fishermen's Maritime Services, Inc., who conducted a very thorough valuation survey of the vessel in December 2001.

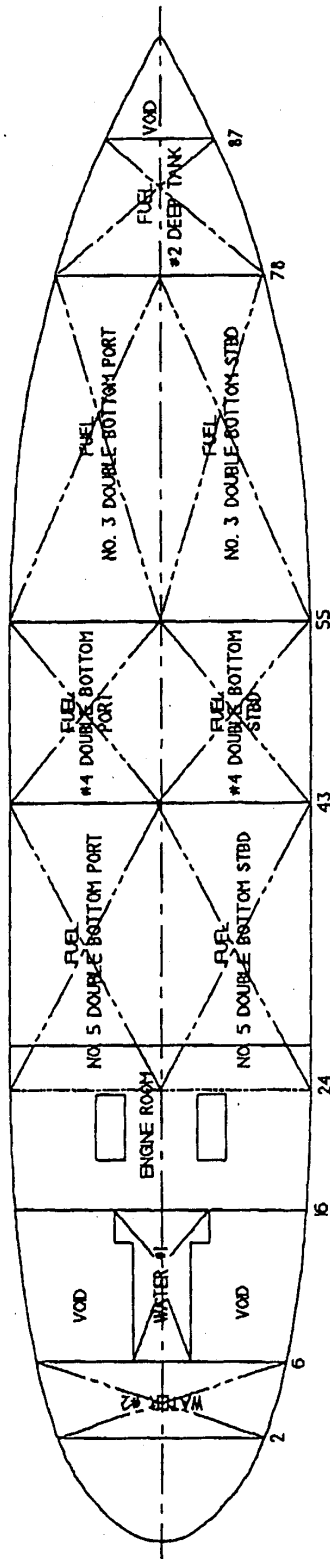


Figure (2): Tank Arrangement

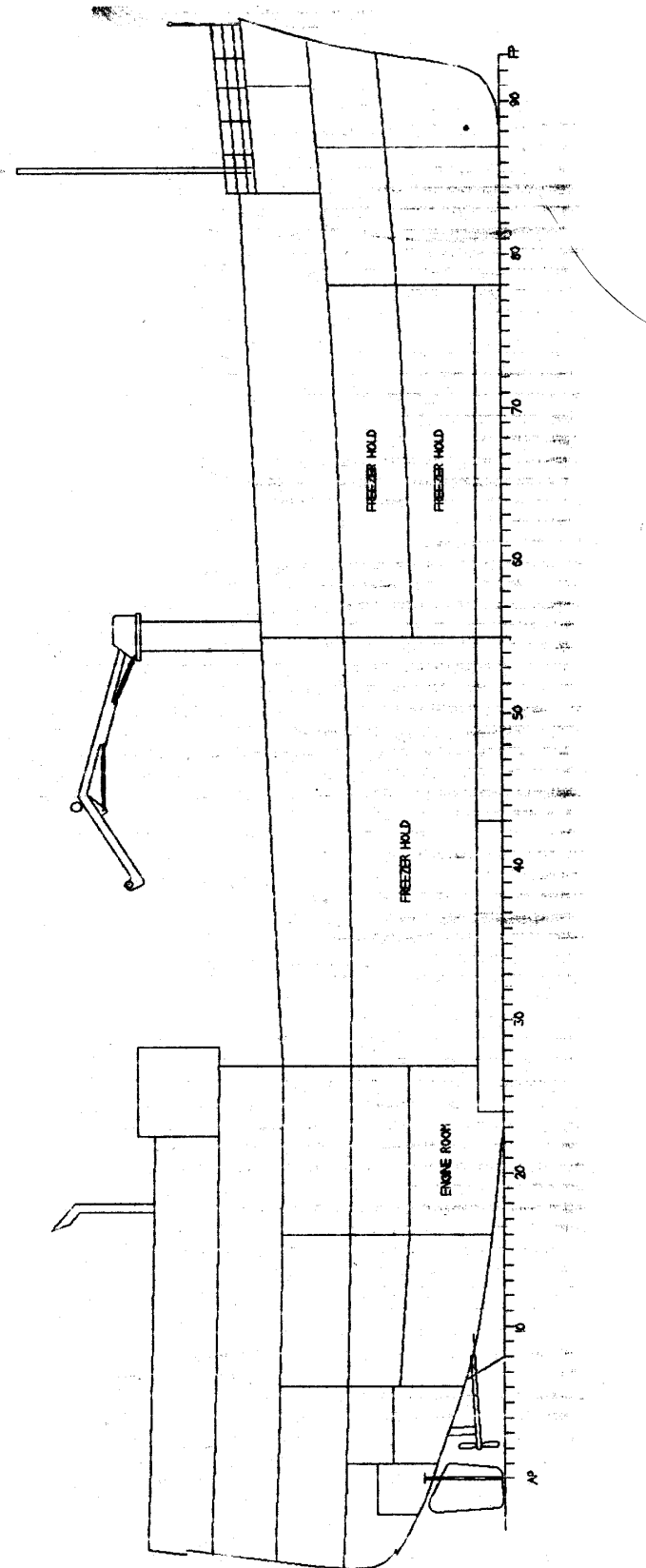


Figure (3): Inboard Profile, Starboard View

f. Freezer Deck Overview: Figure (4) on the following page depicts the freezer deck. This deck is dominated by the vessel's two cargo holds, engine room, and refrigeration machinery spaces. Specific descriptions of each space are provided starting aft and proceeding forward.

Steering / Lazarette: The FPV GALAXY had twin rudders. The 7.5" rudderposts were through packing glands in the steering compartment. Each rudderpost was fit with a hydraulic ram (with opposing actions) to a tiller arm aft. The forward tiller arms were attached to a connecting bar constructed of 3.5" pipe. Power was hydro-mechanical from port and starboard power packs with 20-hp motors and directional valves, which were positioned atop the hydraulic fluid reservoir. Forward of this space contained work benches with tools, supplies, welding gear and storage.

Sewage Treatment System: The steering gear space also housed the vessel's sewage treatment system. It was equipped with a World Water Systems Orca II sewage treatment unit. A vacuum flushing system was equipped with an Envirovac model RCP88019-ME unit with a 5-hp macerator pump to 6" PVC lines. Vents were installed on the tank tops and the vent piping went to the top of wheelhouse.

Refrigeration Spaces and Equipment: The refrigeration system was built by North Coast Refrigeration and installed in 1998. The system was a single stage mechanical ammonia system employing two Mycom 200VSD ammonia compressors. The system had three principal components located in the refrigeration space: the two compressors, a receiver and air purger. The pumps were driven by 150-hp motors with model F-50 PM ammonia pumps driven by 3-hp motors and Mypro-V control units. The receiver and two compressors were each equipped with a safety relief valve which was set at 250 psi. The relief valves were connected to a common piping system which would vent the ammonia to a location on the mast located on top of the wheelhouse.

Lower Engine Room Compartment Arrangement: The vessel's engine room was divided into a lower level (freezer deck level) and an upper level (work deck level). The upper level was on the deck and is described in more detail in section (g) of this chapter. Access into the lower engine room was from an inclined ladder from the main deck and then forward through the refrigeration space. The lower engine room was forward of the refrigeration space and was separated from it with a watertight door and watertight bulkhead. Decks were aluminum deck plates resting in steel frames. Bulkheads were coated steel.

The lower main engine space contained the following equipment: an upper half deck with AC electrical generation plants and switching gear, ancillary machinery, and a lower deck with main propulsion machinery and shafting, fuel and bilge manifolds and pumps, sea water circulation pumps, an air receiver, ancillary machinery and two refrigerant pumps with 3-hp motors (starboard side). The space was equipped with an audible 120 decibel alarm for the fixed CO2 fire extinguishing system and was also equipped with three heat detection alarms of an unknown manufacture.

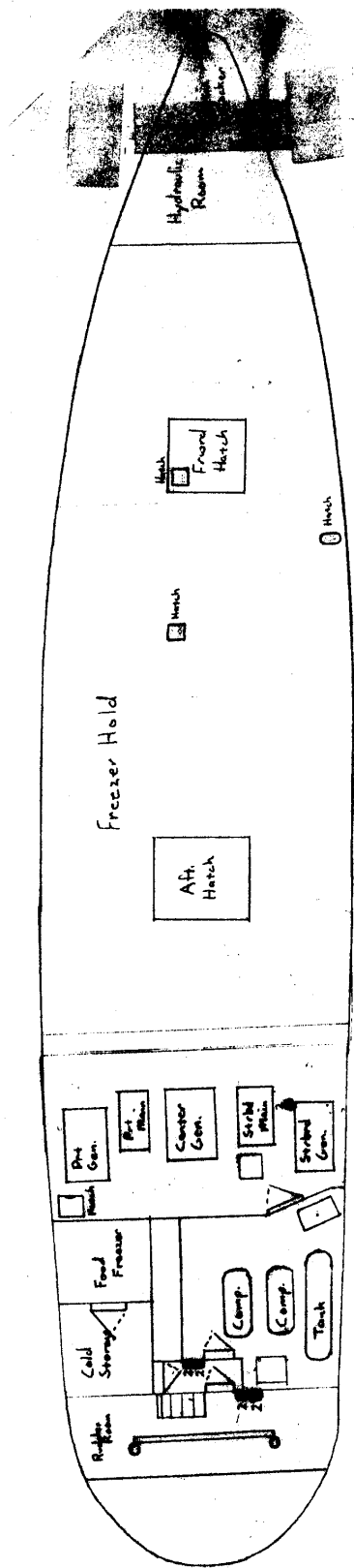


Figure (4): Freezer Deck Arrangement

The following describes the equipment and spaces on the freezer deck.

Port and Starboard Main Diesel Engines (MDE): Both MDEs were Caterpillar 398 diesel 12-cylinder turbocharged engines which delivered 850-hp at 1300 RPM. Each MDE was equipped with three Racor 75/1000 FGX 10-micron filters. Each had pneumatic starters and were cooled through keel-mounted heat exchangers. The MDEs were equipped with electric block heaters and .75 hp prelube pumps. Each was equipped with a low oil pressure, high water temperature and a low jacket water level alarms. These alarms indicated on a panel in the Chief Engineer's office and in the wheelhouse. The fuel consumption rate for each MDE was approximately 28-30 gallons an hour. The dry exhaust was lagged, away from flammable materials and ran through a venturi stack. The reduction gear was a Caterpillar model 7261. Each shaft was a 7" stainless steel bar from the reduction gear through a bronze lubricated packing gland, a stern tube and a water-cooled rubber cutlass bearing. The shaft brakes were caliper and disc with hydraulic activation. The MDEs were serviced annually by NC Machinery, a licensed and authorized service provider. NC Machinery technicians had completed a top end overhaul for the two MDEs in July 2002. The vessel's ABS surveyor, Mr. [REDACTED], provided class oversight to the work completed. A summary of each MDE is provided in Table (2) and a photo of the port MDE is provided in Figure (5).

	Port	Starboard
MDE Serial Number	# 67B1935	# 67B1936
MDE Service Hours (July 02)	13478	13947
Reduction Gear Serial Number	89B4555	89B396

Table (2): Port and Starboard MDE Particulars.

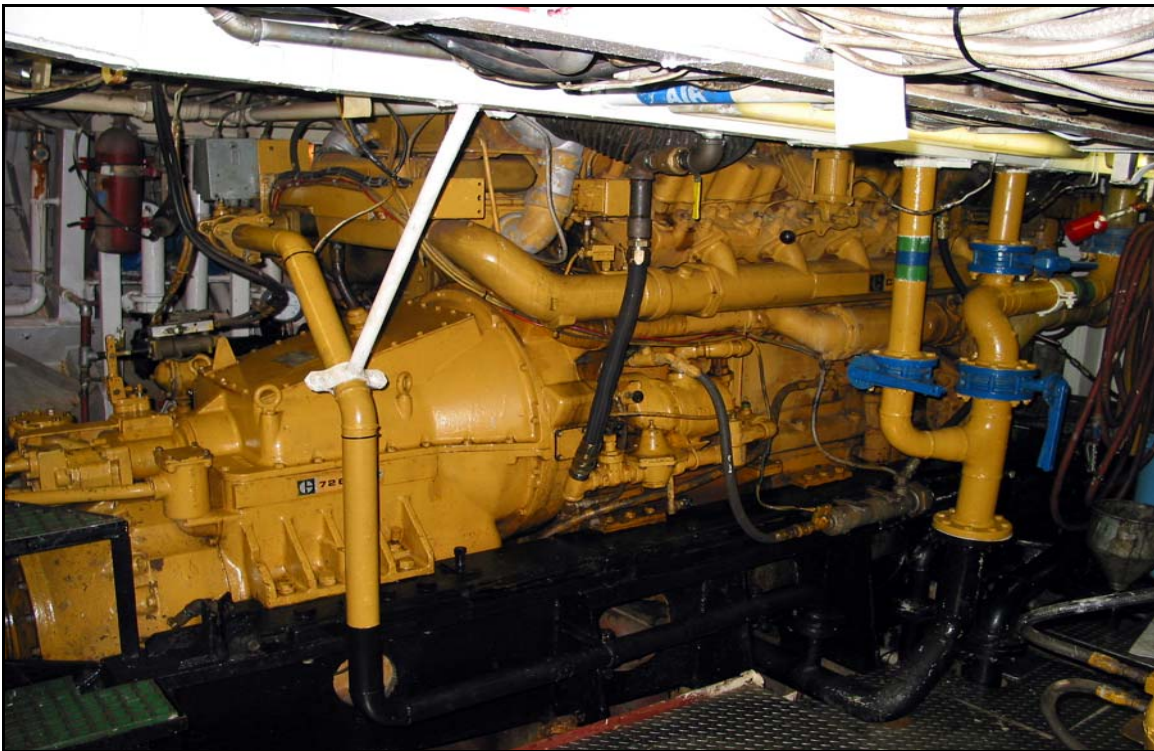


Figure (5): Photo of Port Side Main Diesel Engine taken December 2001

AC Electrical Generation: The vessel was equipped with three turbocharged diesel generators. The generation unit was aft and the auxiliary engine was forward. Each auxiliary engine was equipped with two Racor 75/1000 FGX 10-micron filters. All three auxiliary engines were cooled through keel-mounted heat exchangers. The dry exhaust was lagged, away from flammable materials and ran through a venturi stack. Each auxiliary engine was equipped with an emergency stop switch. Each auxiliary engine was equipped with a low oil pressure alarm, a high water temperature alarm, and a low jacket water level alarm. These alarms indicated on a panel in the Chief Engineer's office and in the wheelhouse. The port and starboard generators consumed approximately 28 gallons of fuel per hour. A summary of each generator and auxiliary engine is provided in Table (3). A photograph of the starboard side generator is provided in Figure (6).

	Port	Center	Starboard
Manufacture	Caterpillar 3408B	Caterpillar 3406	Caterpillar 3408B
Horsepower	507hp @ 1800 RPM	462hp @ 1800 RPM	507hp @ 1800 RPM
Starter Type & Volts	24 Volt Electric	12 Volt Electric	24 Volt Electric
Serial Number	78Z02878	1SS00380	78Z02889
Arrangement	4W9129	177-8878	4W9129
Service Hours (Mar 02)	Unk	4570	3312
Armature (Caterpillar)	SR-4 developing 350 kW @ 1800 RPM	SR-4 developing 300 kW @ 1800 RPM	SR-4 developing 350 kW @ 1800 RPM
Serial Number	6DAO1835	9FF02539	6DAO1837
Arrangement	4W9070	1093791	4W9070

Table (3): Port, Center, and Starboard Generator Particulars



Figure (6): Photo of Starboard Side Generator taken December 2001

DC Electrical Generation: Two banks of eight 12-volt batteries in the engine room provided 24 volts for engine starting for the port and starboard generators. A bank of two 6-volt batteries provided 12 volts for starting the centerline generator engine. Charging for all units was by a McCarron VMI Omni-Step charger. All batteries were in covered plastic boxes. A Teledyne “Big Beam” battery charger was in the steering room.

Electric Panel: A Harris Electric 480-volt main panel with parallel capabilities and was located in the engine room centerline on the aft bulkhead. Distribution panels were found on all decks. A shore power receptacle was on the main deck forward of the house.

Ventilation: The engine space was equipped with both supply and ventilation fans. The engine room vents were located on the forward wheelhouse bulkhead. There was also a ventilation fan on the upper stack. The engine room ventilation closures were altered in 2002. The original design, shown in Figure (7), closed by simply moving the support arm out of the way and allowing the cover to drop down into place over the ventilation duct. With the new installation, fabricated inserts had to be dropped down into place by reaching inside the vent cowling.



Figure (7): Photo of Previous Ventilation Closures for Engine Room taken December 2001

Fuel Oil Distribution System: The fuel manifold was located on the forward engine room bulkhead facing aft. Each line was equipped with manifold ball valves and gate valves. The vessel’s centrifuge was an Alfa-Laval model MAB 104-B-24 60/4108-5. The centrifuge and

fuel piping were newly installed in 2001 under the oversight of ABS. The maximum flow rate through the centrifuge was seven gallons per minute. Once centrifuged, the fuel went to the vessel's two day tanks, each with a volume of 874 gallons. Each day tank was equipped with Pyrex sight glasses. The sight glasses were protected by angled steel on both sides of the sight glass. The sight glasses were equipped with automatic closing valves at the bottom of the sight glass. Should the sight glasses be broken or damaged, the valves would automatically close. There were two Roper gear transfer pumps to a Tokheim flow meter. An emergency stop was inside the port side deck entrance into the superstructure.

Air Receiver: The air receiver was the supply source for pneumatic starts for the MDEs. The receiver was located aft on the port side of the engine room. The capacity of the receiver could not be determined. It was equipped with a safety relief valve set at 250 psi. If the receiver were to over-pressurize, it would vent into the engine room.

Cargo Spaces: The FPV GALAXY had two cargo holds, the larger aft hold had a capacity of 26,362 cubic feet and a forward hold had a capacity of 14,462 cubic feet. Both holds had a cargo hatch overhead and were insulated with coated fire resistant polyurethane foam. Refrigeration evaporator coils were overhead. The sides were fit with wood air circulation stand-offs and decks. The cargo spaces carried a very high fire load due to the presence of polyurethane foam, wood stand-offs, wood dunnage and fiber. Figure (8) below depicts the cargo space.



Figure (8): Photo of Cargo Hold taken December 2001

Each cargo hold had a sump aft and was lighted by fluorescent fixtures. A belted power conveyor ran through both holds. The forward hold was different from the aft hold in that it was a two-level hold that was entered through a main deck hatch. A product elevator ran through both levels and the main deck. Fiber for packaging the finished product was stored in these holds.

Hydraulic Room: Access was down a ladder from the forward main deck. The compartment contained almost all of the vessel's hydraulic machinery, with the exception of the steering gear hydraulics. Also in this space were bilge pumps and sea water supply pumps. A half-height slurry tank occupied most of the area from centerline to starboard. The following hydraulic equipment was located in this space:

- One 3-stage pump with a 75-hp motor.
- Two pumps each with a 50-hp motor.
- Two Continental hydraulics PVR50-70B15-RF-0-5-L with 75-hp motors.
- One 1 x 3/4" control pump with a 5-hp motor.
- A hydraulic power pack with a vane pump on the main deck process area forward was driven by a 10-hp motor and was atop an estimated 50-gallon reservoir.

Chain Locker: The chain lockers were coated and lined with protective wooden offsets. A void was below.

g. Work/Processing Deck Overview: Figure (9) on the following pages depicts the Work / Processing Deck. The forward most space on this deck was a paint locker. An oval flush hatch within this space went to a chain locker located on the deck below. Next aft was a machinery space with hydraulic drives for two anchor windlasses. The bulkheads to sea were coated with high-density polyurethane foam. Aft of this space was a processing area with plate freezers, fish handling and processing equipment. Aft and starboard was a longline gear hauling station. The aft most space on this deck was a gear setting area on the starboard side and to the stern. A machinery casing, laundry with two GE clothes washers and dryers, two heads and a bait freezer were center. Immediately aft of the machinery casing was a vertical ladder leading to the main deck. Immediately aft of the bait freezer was a vertical ladder leading to the lower engine room. To port was a rain gear room, the chief engineer's office, a CO2 room which housed the vessel's fixed fire fighting system, deck storage, and a mooring station starboard aft accessed through a watertight hatch (6-8 dog) from the main deck passage way. This mooring station was equipped with a 10" double bitt. The gear setting area and gear hauling areas were monitored by a closed circuit television (CCTV) monitor. The following are more detailed descriptions of key areas on this deck.

Fish Processing Area: The deck was equipped with Chemgrate wear decking raised on stainless steel angle frames from the steel deck. The ceilings and bulkheads were fit with high-density polyurethane foam insulation with fire retardant coating and 3/8" plastic corrugated panels. On the port side of the processing area was a 12" knife valve going overboard with a hydraulic ram closure mechanism. Aft of the fish bins were wood partitions with a Baader machinery parts and repair room and a room housing a water maker. In addition, there were four 2" sump pumps with 15-hp motors for draining water from the processing space. These were located aft in the processing deck and were fitted with sump heaters. A Wescold chiller fit with temperature controls was located in the main deck processing area. Lighting in the space was from overhead fluorescent fixtures.

Fishing Gear Line (Starboard Side): Aft starboard was a longline gear setting and storage area with a combi-hauler and auto-baiter and a setting hatch in the stern bulkhead. A 21" x 36" ventilation trunk ran to the aft main weather deck.

Gear Setting Station: The gear setting area was insulated with high-density polyurethane foam with fire-retardant coating and 3/8" corrugated plastic panels. There were two hatches in the gear setting area: a 46" x 32" hatch with four dogs, and a sliding 36" x 32" hatch.

Upper Engine Room (Sea Store): Access into this space was through port and starboard six dog hatches.² The deck was comprised of steel grating laid on top of steel frames. The space was equipped with an audible 120 decibel alarm for the vessels fixed CO2 fire extinguishing system. The center of the space housed the fidley inside which was the exhaust piping for the vessel's MDEs and generators. Outside the perimeter of exhaust stacks was additional space to store raingear, clothing, etc. Directly above this space was the machinery casing which housed the fidley.

² There is conflicting testimony as to whether these were four or six dog doors.



Gear Hauling Station: Starboard and outside the enclosed processing area was the gear hauling area with a sliding aluminum closure over a 9' x 54" opening to weather above a 34" bulwark with two 16" x 12" freeing ports and two 16" x 12" scuppers. Figure (10) depicts the gear hauling station.

Carbon Dioxide (CO₂) Room: This port side space housed a 14-bottle (50 pounds each) fixed CO₂ fire extinguishing system which guarded the upper and lower machinery spaces. A complete description of the space is provided in section (I) of this chapter.

Chief Engineer's Office: The Chief Engineer's office was located on the port side, forward of the CO₂ room. It was equipped with an alarm panel to monitor the engine room machinery.



Figure (10): Photo of Gear Hauling Station taken December 2001

h. Main Deck Overview: The main deck was comprised of the exposed weather deck, which was forward of the wheelhouse, and the internal main deck, which was comprised primarily of crew staterooms and the galley.

Weather Deck: The exposed forward main weather deck was protected forward by a 40" railing. The anchor gear was located forward. On the forward main deck was a hatch to the hydraulic machinery space with a two hydraulic cylinder closure mechanisms. Center and aft centerline cargo hatches were to main deck hatches and cargo holds below. An amidships bosun's locker was located forward of a deck crane. The crane was a hydraulically powered Alaska Marine Crane model MCK 1250-88-414 crane. The crane was fit with double swing motors and twin lifting rams. The primary condenser for the ammonia system was located on the forward main deck, just forward of the wheelhouse. Aft of the aft freezer hatch and the ammonia condenser was the full-width deck house. Immediately forward of the deckhouse was the filling station and vents for the vessels various fuel tanks. The deck carried two 9" double bitts and two 7" double bitts for mooring.

Main Deck (Mess Deck): The interior deck was finished with Marlite and suspended acoustical tile ceilings, coated plywood wall panels, and a coated steel deck. There were four staterooms located on the port side and four on the starboard side. A machinery casing was center forward. Aft was a galley and mess area with a door forward to a centerline passage and an inclined ladder to the work deck. Figure (11) depicts the galley. Aft was a mess with four 16" x 16" viewports, ten 2' x 2' aluminum frame viewports and six pedestal tables with bench and stool seating. Figure (12) on the following page depicts the main deck.



Figure (11): Photo of the Main Deck Galley Space taken in December 2001

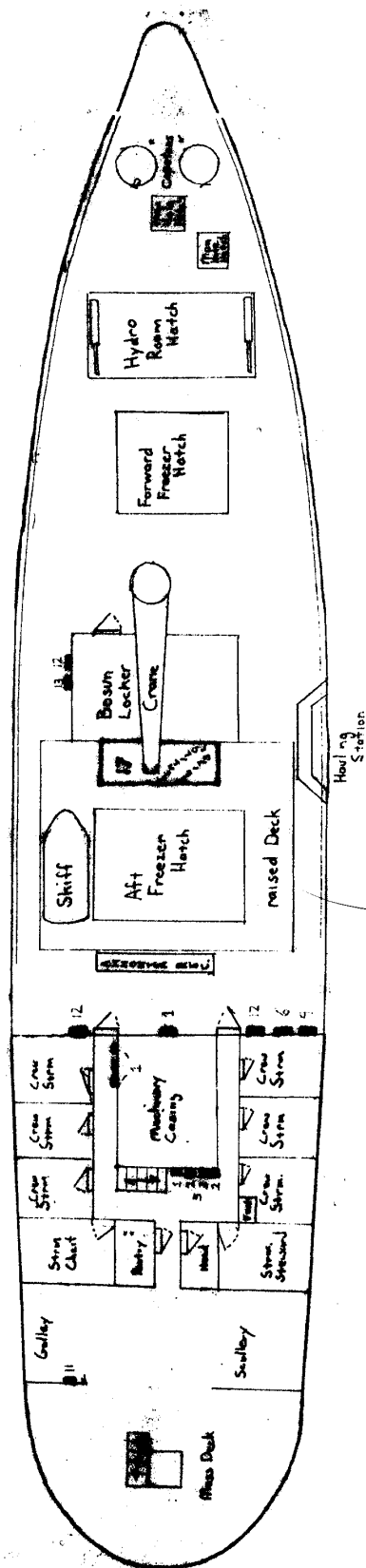


Figure (12): Main Deck Arrangement

i. Pilot House Deck: Figure (13) below is a photo of the wheelhouse. Figure (14) on the following page depicts the full pilot house deck, which was comprised of various staterooms and the wheelhouse. This pilot house deck was stepped, with the forward aspect comprising a navigation bridge. Beneath the wheelhouse was a crawl space used for storage. Aft of the raised bridge was an office and accommodation spaces with machinery casing centerline. A master's stateroom was accessed down an inclined ladder from the starboard side of the wheelhouse. Aft of the office portside was a mate's stateroom, hospital space and three staterooms. Aft of the master's stateroom on the starboard side were five more staterooms. Four heads and a stateroom were center. The deck was finished with Marlite ceilings, coated plywood wall panels, and a coated steel deck.

Wheelhouse: Access from the top deck was through a weather tight hatch starboard from the aft top weather deck and from a port side door pilot house deck port side passage way. The primary con was starboard, but the vessel also had a port conning station. The wheelhouse was fully equipped with navigation, positioning, and communications equipment. In addition, the wheelhouse was equipped with a Bridgewatch alarm system and a Panasonic 1386 closed circuit television system monitor. The wheelhouse was finished with coated plywood panels and wood trim. The wood decks were covered with carpet. Ceilings were suspended acoustical tile panels with recessed fluorescent lighting and were insulated with fiberglass batting. The vessel had multiple systems for internal communications. There was a two-way intercom system, an "A" phone which provided room to room communication, and finally a sound-powered phone which allowed communication between the steering space and the wheelhouse. This system could be operated without hotel power. The "A" phone and intercom system required hotel power.



Figure (13): Photo of the Wheelhouse taken December 2001 (Port to Starboard View)

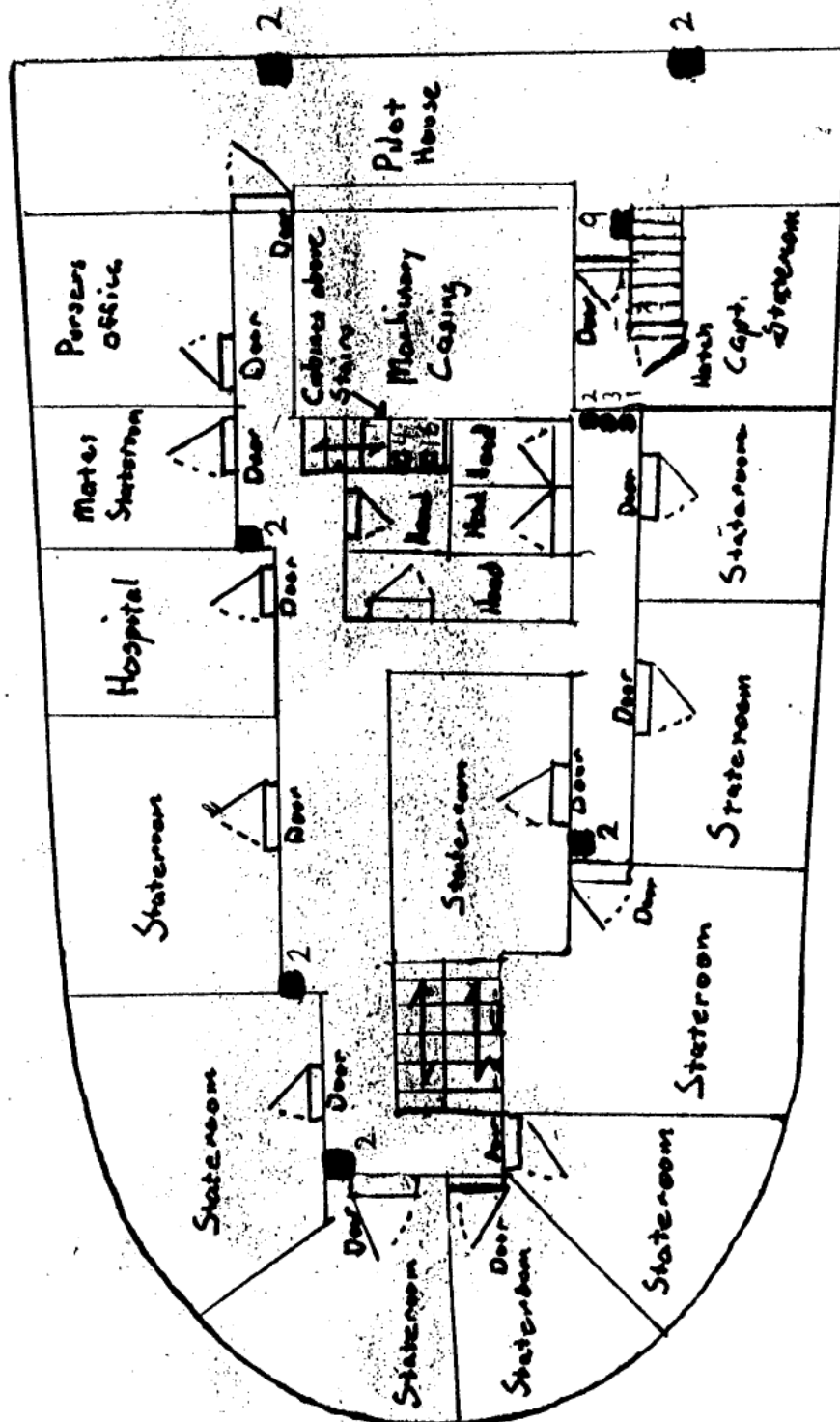


Figure (14): Pilot House Arrangement

j. Top Deck: Figure (15) below is a photograph of the top deck. Figure (16) on the following page depicts the top deck. The top deck was comprised of a full-width wheelhouse which was raised 30". The full deck was guarded by a 40" 3-tier rail and was coated with non-skid paint. Several structures rose from the deck. These structures included:

- A raised ventilation trunk
- A raised trunk with a hatch and inclined ladder leading into the wheelhouse
- A raised trunk with a hatch and inclined ladder leading into the galley
- A tripod mast of 6" pipe with stays of 3-1/2" pipe atop the house. This forward mast carried antennas, fishing and navigation lights and a ladder up the starboard side.
- A second smaller mast was located on the stern. This mast had a centerline ladder.

A steel box on the top deck held three 12-volt 8D batteries charged by a Ratelco 1827 B constant voltage regulator and a McCarron VMI battery charger. A catwalk forward of the house was accessed by a vertical ladder from the work deck. A port and starboard liferaft, two Jacob's ladders (stowed in a box forward of the port side liferaft) and an Emergency Position Indicator Radio Beacon (EPIRB) were also located on the top deck.



Figure (15): Photo of Top Deck Photo (Aft Looking Forward) taken December 2001

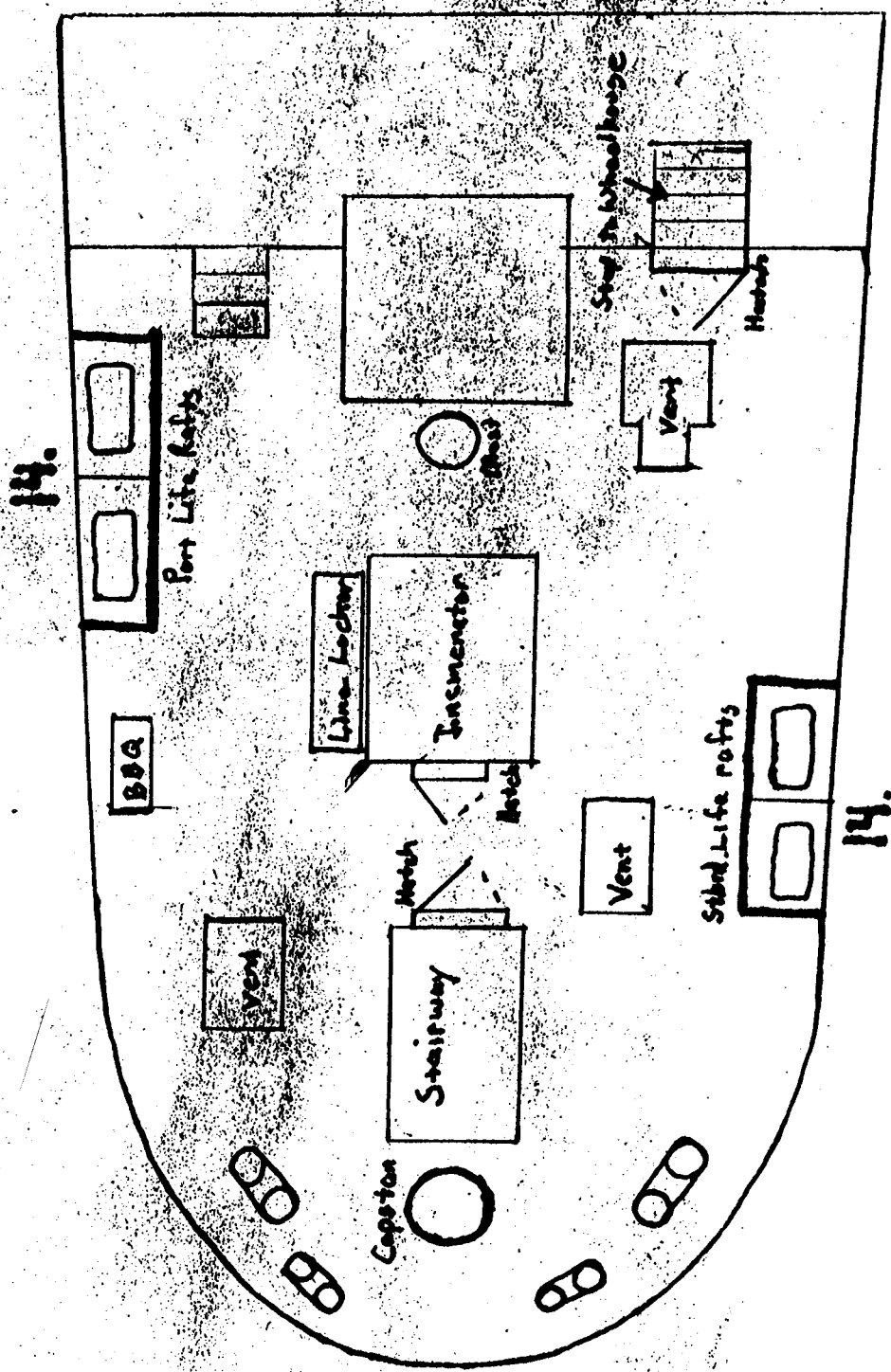


Figure (16): Top Deck Arrangement*
 * Picture depicts four rafts. Vessel only had two rafts

k. Safety Equipment and Lifesaving Arrangements: The FPV GALAXY was equipped with liferafts, survival suits, an Emergency Position Indicator Radio Beacon (EPIRB), Global Marine Distress and Safety System (GMDSS) radios and transponders and visual distress signals. Specific details regarding the individual pieces of equipment are as follows:

Port Side Liferaft: A 450-pound DBC 25-person SOLAS A pack raft was mounted on the top deck. The raft was set in a “U” shaped cradle fit with a Hammer H20-R hydrostatic release. Both the raft and release unit were current at the time of the casualty.

Starboard Side Liferaft: A 375-pound Elliot 20 person SOLAS A pack raft was mounted on the top deck. The raft was set in a “U” shaped cradle fit with a Hammer H20-R hydrostatic release. Both the raft and release unit were current at the time of the casualty.

Liferaft Embarkation: The vessel had two embarkation stations for abandoning ship. The primary location was the starboard side hauling station. The alternative location was the aft gear setting station. In addition to the selection of these two locations, the vessel also had two Jacob’s ladders stowed on the port side near the port side raft.

EPIRB: The vessel was equipped with two EPIRBs. An ALDEN SATFIND M3 (COSPAS/SARSAT Number ADCD04D6C0401) was installed on the top deck with a hydrostatic release. A second 406 EPIRB, an ACR Satellite 406 EPIRB (COSPAS/SARSAT Number – ADCD 0222B4C1401) was stored in the wheelhouse. The registration for both units was current at the time of the casualty.

GMDSS Transponders and Handheld Radios: Two Lokata SART units were installed in the wheelhouse on the bulkheads. The vessel was equipped with three ACR channel 16 VHF radios which were mounted on the starboard side bulkhead near the emergency escape hatch to the top deck. The batteries for all GMDSS equipment were current at the time of the casualty.

Visual Distress Signals: The following flares were stored in an orange plastic watertight box in the wheelhouse: three Pains Wessex MK3 red parachute flares, three Pains Wessex MK5 orange smoke canisters, and six Pains Wessex MK7 handheld flares. All flares were current.

Survival Suits: Five adult Universal suits were stowed in a rack in the wheelhouse. Forty-five adult Universal suits were in a box on the forward main deck immediately aft of the bosun’s locker. All suits had the vessel’s name, lights, whistles and retro-reflective material.

Man Overboard Equipment: Four 30” life rings with line and ACR/SM2 strobe lights were on the vessel in two separate locations: two (one port and one starboard) on the top deck and two on the forward main deck.

Emergency Lighting: The vessel was equipped with individual battery powered battle lantern emergency lights in numerous places on the vessel. The units were tied into the 120 volt AC system and would activate when the ship lost power.

1. Fire Fighting Arrangements: The vessel was equipped with the following fixed and portable fire extinguishing systems.

Fixed Fire Suppression System: A 14-bottle (50 pounds each) CO2 fixed fire extinguishing system guarded the upper and lower machinery spaces. The system was fit with an alarm, time delay and stop valve and was installed in accordance with 46 CFR Subchapter H. The system was not designed to protect the refrigeration space. The total volume of the space covered by the system was 13,586 cubic feet. The system was installed by Western Fire and Safety in 1999. The system could be activated from two locations. The manual controls were located in the CO2 room and the remote controls were located across the passageway underneath the stairs leading from the work deck to the main deck. Audible 120 decibel alarms were installed in the upper and lower engine rooms. In addition, there was an audible and visual strobe alarm installed on the passageway bulkhead outside and six feet forward of the CO2 room. The system was last inspected in July 2002. The inspection noted that the visual strobe alarm was not operational. This deficiency was corrected by Mr. James O'Donnell the same day as the inspection.

The system was serviced annually by Western Fire and Safety. The system was last inspected and serviced by Mr. Roy Brown of Western Fire and Safety in July 2002. The inspection noted that the visual strobe alarm located on the port side bulkhead on the work deck was not operational. This deficiency was corrected by Mr. James O'Donnell the same day as the inspection. During the inspection Mr. Brown reviewed the operation of the fixed CO2 system with Mr. O'Donnell and Mr. Vielma. The paint locker was also equipped with a 16-pound heat activated automatic Halon system.

Portable Fire Extinguishers: The FPV GALAXY was equipped with numerous portable fire extinguishers. These extinguishers were last serviced by Western Fire and Safety in July 2002. Table (4) lists the portable fire extinguishing equipment found on board.

Location	Agent	Type/Size	Last serviced
Pilot House Deck (2)	CO2	BC II	July 2002
Pilot House Deck (2)	Halon	BC I	July 2002
Pilot House Deck (3)	Dry Chem	A II BC III	July 2002
Main Deck (3)	Dry Chem	A II BC III	July 2002
Main Deck (1)	Dry Chem	A II BC II	July 2002
Work Deck (1)	Dry Chem	A II BC III	July 2002
Work Deck (4)	CO2	BC II	July 2002
Freezer Deck (4)	CO2	BC II	July 2002
Freezer Deck (4)	Dry Chem	A II BC III	July 2002
Freezer Deck (2)	Dry Chem	A II BC II	July 2002

Table (4): Portable Fire Extinguishers

Fire Main and Hose Systems: The fire main was a three-inch line which was normally operated at 40 psi but could be increased to 80 psi if necessary. The vessel was equipped with numerous fire stations, hoses, and fire axes. The emergency fire pump was located in

the engine room and powered off the AC generation units. Table (5) below describes this equipment.

Location	Hoses	Nozzle	Wrench	Comments
Work Deck fwd process area	2	1	1	
Work Deck process area	1	1	1	
Work Deck passage	0	0	0	1 axe – no hydrant
Main Deck accommodations	0	1	1	
Work Deck Gear setting area	1	0	0	
Pilot House Deck accommodations	1	1	1	1 axe
Main Deck accommodations	1	1	1	1 axe
Main Deck accommodations	2	0	0	1 axe – no hydrant 4 hose racks
Forward Main Weather Deck	1	1	0	2 hydrants

Table (5): Fire Hydrant Stations – Hoses were 50’ of 1-1/2” diameter approved fire hose.

Fire Suits and SCBAs: The vessel was equipped with two fire fighting suits on the main deck passages. The vessel was not required by regulation to carry the fire suits. The vessel was also equipped with two Self Contained Emergency Breathing Apparatus (SCBA). Both SCBA units were on the work deck near the aft entrance to the lower engine room.

Heat and Smoke Detectors: The vessel was equipped with smoke detectors in the accommodation spaces and three heat detectors in the engine room. The heat detectors in the engine room were of an unknown manufacturer and had an unknown temperature setting. The center heat detector was installed directly above the centerline generator and the other two detectors were installed between the port side MDE and generator and the starboard side MDE and generator.

5. FISHERY INFORMATION

The FPV GALAXY operated in the BSAI Pacific cod fisheries. The Pacific cod fisheries in the Exclusive Economic Zone (3 to 200 miles offshore) off Alaska are managed under the BSAI Groundfish Fishery Management Plan (FMP) as developed by the North Pacific Fishery Management Council under the Magnuson – Stevens Fishery Management Act (MSA). Since 1999, Pacific cod has been allocated to six primary gear/vessel types:

- Trawl Catcher Vessels (CV)
- Trawl Catcher Processor Vessels (CP)
- Hook and Line Catcher Vessels (aka longliners)
- Hook and Line Catcher Processor Vessels (aka freezer longliners)
- Pot Catcher Vessels
- Jig Catcher Vessels

Each gear group is allocated a portion of the BSAI Pacific cod resource. Allocations for calendar year 2002 are provided in Table (6) below and are measured in metric tons. Freezer longliners as a gear group have the largest allocation of the BSAI cod resource.

	Total Allowable Catch (TAC)	Total Catch Harvested	Percent of TAC Harvested	Total Allocation to Gear Group
Trawl (CV)	36,975	36,496	99 %	20.2%
Trawl (CP)	41,475	41,237	99 %	22.6%
Longline (CP)	89,920	89,399	99 %	49.1%
Longline (CV)	482	404	84 %	0.3%
Pot Vessels	14,035	14,878	106%	7.7%
Jig Vessels	300	164	55%	0.2%
Total	183,187	182,578	99.7%	

Table (6): Harvest Allocation for BSAI Pacific Cod, 2002

Source: National Marine Fisheries Service

There are approximately 42 vessels licensed to operate as freezer longliners in the BSAI/GOA fisheries and another 22 vessel licensed to operate as freezer trawlers in the BSAI/GOA non-pollock trawl fisheries. The total number of vessels participating in the Pacific cod fishery is currently limited by a License Limitation Program that was implemented on January 1, 2000. The LLP limits the total number of vessels participating in the fishery, but does not limit or set catch quota for each individual vessel participating in the fishery. As such, vessels within each gear group compete with the other vessels in the gear group for catch.

For hook and line vessels there are two primary fishing seasons for Pacific cod annually in the BSAI management area. “A” season begins on January 1st and usually runs through the end of March. “B” season usually begins around August 15 and continues through November. The “A” season is a higher value season because the cod harvested are a spawning stock and have roe and milt, both of which are highly valued in overseas markets. During “A” season, the cod are more concentrated, and consequently catch per unit of effort is higher. The FPV GALAXY has fished both “A” and “B” seasons for cod since 1998.

Fishery Management and Safety: Fishery management systems define the playing field in which the fishing industry operates. Fishery management activities such as timing of seasons, limitations on vessel and crew size, the size of the fishing fleet, and gear requirements/limitations all can impact safety. Safety is a principle consideration in the development of fishery management plans and a national standard of the MSA, as amended by the Sustainable Fisheries Act. Specifically, National Standard Ten requires that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea. National Standard Ten, through its implementing regulations found in Title 50, Code of Federal Regulations (CFR), Part 600.355, provides broad direction to fishery management councils on how to address safety within the context of Fishery Management Plans.

6. VESSEL OWNERSHIP AND MANAGEMENT RESPONSIBILITIES

Owner and Operator: The FPV GALAXY was the only vessel owned and operated by Galaxy Fisheries which is a Limited Liability Corporation (LLC) operated out of Seattle, Washington. Galaxy Fisheries LLC has no corporate officers, but has two members, Aleutian Spray Fisheries, Inc. and [REDACTED] Aleutian Spray Fisheries is the managing member. Mr. [REDACTED] is the President of Aleutian Spray Fisheries. Aleutian Spray Fisheries operates the following vessels in the BSAI fisheries:

<u>Name</u>	<u>Gear Type</u>	<u>Fishery (ies)</u>
Starbound	Factory Trawler	Pollock
Galaxy	Longliner	Cod
Horizon	Longliner	Cod
Starward	Trawler	Pollock/Crab
Starlite	Trawler	Pollock/Crab
Starfish	Trawler	Pollock/Crab
Nordic Star	Trawler	Pollock/Crab
Arctic Wind	Trawler	Pollock/Crab
Golden Dawn	Trawler	Pollock/Crab

Each of these vessels is supported out of the Aleutian Spray Fisheries, Inc. office in Seattle, Washington. Numerous vessel support functions, including vessel logistics, human resources, port engineering, and accounting are carried out by staff in this office. FPV GALAXY captains reported directly to Mr. [REDACTED]

7. BERING SEA SEARCH AND RESCUE (SAR) / COMMUNICATIONS COVERAGE

All search and rescue (SAR) operational assets in the Bering Sea are under the operational control of the Seventeenth Coast Guard District in Juneau, Alaska. The Command Center at the District Office coordinates all SAR cases in the Bering Sea. The U.S. Coast Guard has its primary Bering Sea search and rescue (SAR) air assets, HH-60J Jayhawk helicopters and C-130 fixed wing aircraft, based out of Kodiak, Alaska. The U.S. Coast Guard also typically operates one or two 378' High Endurance Cutters (WHEC) in the Bering Sea at any given time. Each WHEC has a single HH-65A Dolphin helicopter on board. These aviation and afloat assets are multi-mission in nature and patrol the international maritime boundary line between the U.S. and Russian Federation, conduct domestic fishery boardings, provide SAR coverage and perform various other missions.

On October 20, 2002 the U.S. Coast Guard had several SAR assets forward deployed in the Bristol Bay region due to the presence of the Bristol Bay red king crab fleet on the fishing grounds. The Bristol Bay red king crab season has historically had a significantly increased SAR work load. As such, the U.S. Coast Guard has dedicated SAR assets to cover this fishery. According to the testimony of Lieutenant Deborah Darminio, the high-risk SAR period is typically 2-3 days before the start of the fishery and a week following the end of the fishery. The 2002 Bristol Bay red king crab season began October 15, 2002. On October 20, 2002, the U.S. Coast Guard Cutter (USCGC) JARVIS was on search and rescue standby patrolling near the crab fishing grounds and an HH-60J helicopter was forward deployed to Cold Bay. The HH-60J had been conducting over flight patrols of the king crab savings area, located in the Bristol Bay region.

In addition to the additional SAR assets available on the fishing grounds, U.S. Coast Guard LORAN Station St. Paul had been conducting a 24-hour VHF radio watch during the red king crab season. This radio watch is not mandated by Seventeenth District policy but was implemented by the current Commanding Officer at LORSTA St. Paul. The VHF radio antenna at LORSTA St. Paul provides a coverage area of approximately 30 miles.

8. COMMERCIAL FISHING VESSEL SAFETY REGULATORY OVERSIGHT

Commercial fishing vessel safety, including operational and equipment carriage requirements, are regulated by several federal agencies. These agencies include the U. S. Coast Guard, the Occupational Safety and Health Administration (OSHA), and the National Marine Fisheries Service (NMFS).

a. U.S. Coast Guard: The primary and historic responsibility for commercial fishing vessel safety resides with the U.S. Coast Guard. The U.S. Coast Guard regulates commercial fishing vessels under numerous statutes and regulations that address vessel manning, licensing, vessel operations, and safety equipment carriage. Generally, the legislative authority which the U.S. Coast Guard uses to enforce safety concerns on fishing vessels is provided in the Commercial Fishing Industry Vessel Safety Act of 1988 (CFIVSA). The statutes and regulations which affected the FPV GALAXY are summarized in Table (7):

	Applicability	Statute	Regulations
Certificate of Class	FPV built or converted after 27 Jul 90	46 USC 4503	46 CFR 28.720
FPV Certificate of Compliance	All Uninspected FPV's	46 USC 4501, 46 USC 4502	46 CFR 28.710, 46 CFR 28 Subparts A, B, C, D
Loadline	FPV \leq 5000 GT	46 USC 5102	46 CFR Subchapter E
Navigational Watch	Not applicable	Not applicable	Not applicable
Engine Room Watch	Not applicable	Not applicable	Not applicable
Licensing Master Chief Mate Chief Engineer Assistant Engineer	All vessels \geq 200 GT	46 USC 8304	46 CFR 15.805 (a) 46 CFR 15.810 (c) 46 CFR 15.820 (b) 46 CFR 15.825 (a)

Table (7): Summary of Statutes and Regulations for FPV GALAXY

As stated previously, the FPV GALAXY was a 1370 gross ton, 180 foot, steel hulled fish processing vessel with 26 people on board. The vessel was considered to be an uninspected fish processing vessel under the definition provided in 46 CFR Part 28.50 because she had the processing equipment on board to produce fillets. The vessel held a current International Loadline Certificate, a current Certificate of Class, and a current Certificate of Compliance.

While the U.S. Coast Guard has statutory responsibility for ensuring compliance with fishing vessel safety regulations, the laws directs accepted 3rd party organizations such as American Bureau of Shipping (ABS), Det Norske Veritas (DNV), and others to issue Certificates of Class, Loadline Certificates, and Certificates of Compliance. As such, the U.S. Coast Guard's role in ensuring compliance with classed commercial fishing vessels occurs administratively and through an at-sea boarding program. Administratively, the local U.S.

Coast Guard Marine Safety Office is responsible for keeping on file a copy of all certificates issued by 3rd party organizations to fish processing vessels.³

The other arm of regulatory enforcement is through at-sea boardings. Traditionally, the U.S. Coast Guard provides oversight of federal safety regulations through at-sea fishery boardings conducted under the boarding authority granted to the U.S. Coast Guard in 14 USC 89. According to testimony provided during the hearing by Mr. Dan Hardin, the Fishing Vessel Safety Coordinator for the Thirteenth Coast Guard District, while at-sea boarding teams conduct a brief safety examination of the vessel, the main focus of these at-sea boardings is to enforce federal fishery regulations. According to U.S. Coast Guard boarding records, the FPV GALAXY had not been boarded at sea since 1996⁴.

American Bureau of Shipping (ABS): The CFIVSA requires that approved 3rd party organizations such as ABS certify that new or converted fish processing vessels are classed, loadlined, and in compliance with the standards proscribed in 46 CFR Part 28. The following certificates were issued by ABS:

- Certificate of Class: The FPV GALAXY's hull and machinery were classed as Maltese Cross Fishing Service; AMS. The Certificate of Class was issued by ABS on November 18, 1999 and would have expired on September 30, 2004. Various annual surveys are conducted to ensure the vessel remains in class during this period. The most recent hull and machinery surveys were successfully completed on July 30, 2002. Under this certificate, the FPV GALAXY was considered to have a "manned engine space."
- International Load Line Certificate: ABS issued an International Load Line Certificate to the FPV GALAXY on 23 December 1999. The certificate was valid until September 30, 2004. An annual survey was completed by ABS on July 30, 2002.
- Certificate of Compliance: A Certificate of Compliance is certification that a fish processing vessel is in compliance with the applicable provisions of 46 CFR Part 28 and 33 CFR Parts 151 and 155. This certificate was issued by ABS on July 20, 2001 and is valid for 2 years upon issuance. An annual survey is not required. During this inspection, the life saving arrangements, including the location of the survival suits, the liferaft launching arrangements and the abandon ship locations were all evaluated and determined to be acceptable to ABS. In addition, the manning and licensing requirements for the engine room staff were also evaluated and found to be acceptable and compatible with the "manned engine space" status of the vessel's classification.

b. Occupational Safety and Health Administration (OSHA): OSHA has significant regulatory oversight over commercial fishing vessels which have a crew size greater than 10 people. OSHA's jurisdiction is limited to addressing those safety issues which are not addressed by the USCG and other federal agencies. While OSHA's jurisdiction only extends

³ The FPV GALAXY's Certificate of Class, Certificate of Compliance, and International Loadline Certificate were issued in Seattle, WA. Therefore, copies of these records were kept at Marine Safety Office Puget Sound.

⁴ Captain [REDACTED] had testified that the FPV GALAXY had been boarded at sea in 2000, but records of the boarding could not be located by the U.S. Coast Guard Seventeenth District Office.

to three nautical miles at sea, the vessel must be in compliance with OSHA's regulations whenever the vessel is operating inside this three-mile zone. As such, enforcement activities tend to occur in port. OSHA has never conducted an inspection on the FPV GALAXY since it was purchased by GALAXY LLC and converted to a freezer longliner in 1997. Those vessel systems and practices for which there are enforceable regulations in place include:

- On-board cranes and their maintenance and use
- Powered vehicles on board
- Cutting and welding permits, tests prior to work and competent persons.
- Portions of the ammonia system and refrigerants other than ammonia
- Chlorine storage and use
- Tools and portable equipment (this can include machine guarding on portable machinery)
- Reporting of illnesses and injuries
- Ropes, wire, manila and synthetic
- Chains, hooks and slings
- Sources of ignition including smoking
- Confined spaces, including testing of oxygen deficient or potentially oxygen deficient atmospheres
- Warning signs and labeling of control switches
- Maintenance: painting, lockout/tag out, unguarded holes in decks
- Gas cylinders, use and compatibility
- Relief valves on refrigerant piping
- Vessel Access (gangways) – except for ship's crew
- Elevators and dumbwaiters
- Illumination of work areas and accommodation spaces
- Steam hose use and fittings

- Working around radars and other emission devices
- Gas masks and canisters
- Respiratory protection programs and respirator checks
- Washing, bathing, toilet and clothes washing facilities, hospital spaces, mess rooms, and kitchens
- Noise
- Personal protective equipment
- Materials handling and storage
- Asbestos, chemical exposures, and health hazards
- Hazard communications
- Blood borne pathogens
- Open sided floors and platforms
- Stairs – except for ship’s crew
- Longshoring activities conducted by processor employees or stevedoring company
- General duty clause – may be used to address any other recognized hazard for which no specific standard exists and which may cause serious harm or death.

c. National Marine Fisheries Service: Under the regulations provided in 50 CFR 600.746 all commercial fishing vessels carrying a federal fishery observer must demonstrate compliance with existing U.S. Coast Guard safety regulations. Because the FPV GALAXY was a 180-foot catcher processor engaged in fisheries with a mandatory fishery observer requirement, the vessel was required to demonstrate compliance with existing fishing vessel safety regulations by having a current Certificate of Compliance and Certificate of Class issued by ABS. One part of these regulations is that they encourage the observer to briefly walk through the vessel's major spaces to ensure that no obviously hazardous conditions exist. The observer is encouraged to spot check major safety items for compliance with applicable U.S. Coast Guard regulations. Ms. [REDACTED] and Mr. [REDACTED] completed this evaluation successfully on October 12, 2002 with no deficiencies noted.

9. VESSEL / FISHING / PROCESSING OPERATIONS

a. Vessel Operations: Daily operational management of the vessel while underway or fishing was the responsibility of the master of the vessel, Captain [REDACTED]. These responsibilities include watch keeping, manning, crew size, on board training (including safety training), fishing operations, offload operations, and overall safety of the vessel. The FPV GALAXY usually operated with a crew numbering between 23-27 people. The master determined appropriate crew size, composition, and watch standing practices. On its last voyage, the crew of the FPV GALAXY was divided into the following functional areas / departments as depicted in Table (8).

	# in Department	Shift Rotation
Navigation Department	2	12 Hours On, 12 Hours Off
Engineering Department	2	12 Hours On, 12 Hours Off
Deck Department	6	16 Hours On, 8 Hours Off
Processing Department	12	16 Hours On, 8 Hours Off
Hotel Services	2	12 Hours On, 12 Hours Off
NMFS Observer	1	No shift

Table (8): Functional Organization of FPV GALAXY on Final Voyage.

The navigation, engineering, and hotel services departments were divided into two 12-hour shifts. The deck and processing departments were on 16-hour shifts to ensure that the vessel could maximize fishing and processing time. According to testimony provided during the hearings, neither the navigation nor the engineering departments assisted in the processing or catching of fish.

However, the two Chief Engineers, (Mr. [REDACTED] and Mr. [REDACTED]) and the Assistant Engineer, Mr. [REDACTED], each testified that they were only in the engine room approximately 50%-60% of their watch because they had other duties to attend to outside of the actual engine room space.

Mr. [REDACTED] stated, "In a day I'm probably physically in the machinery space at least between four and five hours."

Mr. [REDACTED] stated that he was in the engine room every 15 –20 minutes and stated, "Pretty much all day we're walking around the boat, making sure that the fishing gear are working properly and the processing area also."

Mr. [REDACTED] testified, "When I am not busy, I am not doing factory maintenance, I am in engine room every fifteen minutes."

b. Fishing Operations: The deck crew was responsible for deploying and recovering the fishing gear. The FPV GALAXY usually had six people assigned to the deck department. The gear was baited with a Mustad EMS-D auto baiter and deployed from the stern of the vessel using an automated Mustad system, which assists in the launching of the longliner gear.⁵ Typically the FPV GALAXY could bait and haul about 34 magazines (56,000 hooks) of gear during a 24-hour period.

The gear was recovered using a hydraulically powered hauler, which pulled the groundline on board the vessel at the starboard side hauling station. As the line was hauled, individual fish are brought aboard, gaffed and sent via conveyor to a 26' x 12' stainless steel fish holding bin (aka bleed tanks) manufactured by Carnitech. The capacity for the bleed tank was 85,000 pounds. As processing workers needed additional fish on the processing line, the hydraulic doors to the bleed tanks were opened, allowing fish to flow out. The fish flowed forward to a trough and then went up a series of conveyors to the specific heading or processing machines.

c. Head and Gut / Processing Operations: The heading machines on the FPV GALAXY were capable of cutting the head off to meet customer specifications (either a "C" cut or a "J" cut). Once the fish were headed, the offal was washed off, ground up and pumped overboard. The headed fish were then sent to stainless steel washing and packing tables where processors cleaned the fish and removed any additional offal. The fish were then put into pans and frozen in one of five 10-shelf 90"x 48" plate freezers. The frozen fish were then broken out of the freezer, bagged, taped, and stored in the vessel's cargo holds.

In addition to head and gut operations, the FPV GALAXY was also capable of being a fish processing vessel as defined in 46 CFR 28.50. If necessary, specific processing equipment was onboard to process fillets, mince, or other products as buyers dictated. The processing crew on the FPV GALAXY was typically 12 people.

⁵ Longline gear generally consists of the following components: a ground line, gangions, hooks and anchors. The ground line is usually 3/8" nylon line. On the ground line is a swivel hook every 42 inches, and hanging from this swivel hook is a gangion that is about 18 inches long. The baited hook, called a "J" hook, is secured to the end of the gangion. At the end of each ground line is a flag pole and buoy, which is used to find the gear and is attached to a 60 pound anchor which holds the gear near the bottom. Each set of gear is called a skate, and there are seven skates of gear per magazine, also know as a "mag". There are 1165 hooks per magazine.

10. SAFETY TRAINING, INSTRUCTIONS AND EMERGENCY DRILLS

U.S Coast Guard required safety training for the crew can be divided into two different categories: training necessary for maintenance of mariner's licenses or merchant mariners document (MMD), and training for all crew members as required by the Commercial Fishing Vessel Safety Act of 1988 (CFIVSA).

a. Training Necessary for Mariner's License: According to testimony and documents introduced during the hearing, the master, mate, and chief engineers of the FPV GALAXY all attended the North Pacific Fishing Vessel Owner's Association (NPFVOA) Basic Safety Training (BST) in May 2001 in order to fulfill their training requirements for their U.S. Coast Guard issued licenses. The BST training conducted by the NPFVOA has been approved by the U.S. Coast Guard. Mr. [REDACTED], Mr. [REDACTED], Mr. [REDACTED], and Mr. [REDACTED] attended and successfully completed this BST safety training. The BST safety training is a five-day course which provides instruction, demonstration, and hands-on practice of the following safety topics:

- Abandon ship procedures
- Survival craft deployment, boarding, and use of equipment
- Use of personal life saving equipment
- Recovery of persons overboard
- Use of emergency radio equipment (including portable VHF radios, EPIRBs and SARTs)
- Shipboard emergency contingencies
- Value of emergency instruction and drills
- Fire Safety Training: Part of the BST training was a two-day fire fighting training session that was provided at the North Bend Fire Academy at North Bend, Washington. The course was divided into one day of classroom instruction followed by one day of hands on fire fighting. Instructional topics for this part of the training included:
 - Theory of fire
 - Fire prevention
 - Fire detection
 - Fire fighting equipment

- USCG fixed CO2 system demonstration⁶
- Ship fire fighting organization
- Ship fire fighting strategy and tactics

In addition, the fire training also covered fire fighting strategies and tactics and included information about the importance of maintaining closures and the use of ventilation. The instruction provided did not address backdraft explosions or warning signs for backdraft explosions.

b. Training Required by the CFIVSA: As a documented commercial fishing vessel operating beyond the boundary line, the FPV GALAXY was required to conduct emergency training, drills, and instruction as required by 46 CFR Part 28.265 and 46 CFR Part 28.270. The specific regulations applying to safety training, instructions and drills are extensively covered in Chapter 12 of this report.

c. Watch Quarter and Station Bill: Crew members were specifically responsible for individual actions during various shipboard emergency drills. These emergencies included fire, abandon ship, man overboard, and flooding. These responsibilities were detailed in the vessel's watch, quarter, and station bill (WQSB). The most recent WQSB was issued on board the vessel on October 13, 2002. Mr. Stephens assigned these emergency responsibilities to the crew and was responsible for ensuring the crew was properly trained in their emergency duties.

d. Safety Training and Record Keeping on the FPV GALAXY: According to the testimony provided, Mr. Stephens was responsible for conducting the safety training, instructions, and emergency drills on the FPV GALAXY. According to 46 CFR 28.270 and 46 CFR 28.275, Mr. Stephens needed to be specially trained or certified to conduct this training on board the FPV GALAXY.

Although not required to do so, the FPV GALAXY logged their safety orientation and training in the pilot house log and on separate monthly training sheets. These logs and training sheets were submitted to the Aleutian Spray office upon completion of each product offload. Coast Guard Exhibit 13, labeled as "Mandatory Monthly Drills" and dated August 1, 2002 was the most recent monthly drill sheet that was available from the FPV GALAXY. All hands signed this Mandatory Monthly Drills sheet.

During the hearings, each crew member was asked numerous questions regarding safety instruction and drills conducted on board the FPV GALAXY. The following is a summary of the statements made regarding the type and frequency of the instruction and emergency drills they participated in while onboard the FPV GALAXY. The statements are organized by the departments in which the crew worked.

⁶ There is conflicting testimony between Captain [REDACTED] and Mr. [REDACTED] (the instructor) as to whether a demonstration of a fixed CO2 system, including the system's alarm, was conducted during this training in May 2001.

Navigation Department

Captain [REDACTED] Captain [REDACTED] had accumulated extensive background in safety training since entering the commercial fishing industry. As the master on board the FPV GALAXY, he was responsible for ensuring that safety training, instruction, and drills were being conducted. He had delegated the responsibility of providing training, instruction, and drills to Mr. [REDACTED]. Captain [REDACTED] indicated that emergency instruction, training, and drills were done at the beginning of every trip or following every offload and that this training was required for all hands. He acknowledged that the Chief Engineers had excused themselves from the training. He stated that from August 1, 2002 – October 20, 2002 there had been safety training and drills on August 1st, September 4th, and October 13th. Captain [REDACTED] stated that all hands were familiar with their assignments on the vessel's WQSB. He also testified that, based upon his knowledge, all aspects of the safety training, instruction, and drills were being conducted on a regular basis.

In reviewing the specific drill requirements as required by 46 CFR 28.270 (a), Captain [REDACTED] testified as follows:

- Abandoning the vessel: Instruction was provided on where to muster and how to abandon ship.
- Fighting a fire in different locations on board the vessel: Fire teams practiced the donning of SCBAs and fire suits during scheduled safety training evolutions. During normal vessel operations, particularly for wash down purposes, fire hoses were charged and dragged around to various locations in the vessel. Captain [REDACTED] stated that to his knowledge the fire teams had never conducted a main space fire drill.
- Recovering an individual from the water: He stated that on numerous occasions he had used the vessel's loud speakers to instruct the deck crew to construe recovery of long line gear as a man overboard evolution, including the use of lookouts. Recovery of the gear (MOB) was made from the starboard side gear hauling station. He stated that he was unsure if there had ever been any specific training conducted on board for utilizing a rescue swimmer.
- Launching survival craft and recovering lifeboats and rescue boats: He testified that crew members were taken up to the top deck and shown how to launch a liferaft.
- Minimizing the effects of unintentional flooding: Captain [REDACTED] stated that the drills required to minimize the effects of unintentional flooding were being conducted when the deck crew and processors secured watertight enclosures, checked dewatering boxes, ensured that sumps were clean, examined check and gate valves, etc.
- Donning immersion (aka survival) suits and other wearable personal flotation devices: Captain [REDACTED] testified that this was done at every safety training session.

- Donning a fireman's outfit and SCBA: He testified that this was done at every safety meeting by the members of the fire team.
- Making a voice radio distress call, and using visual distress signals: No testimony provided.
- Activating alarms: He testified that this was done at every safety training session.

Engineering Department

██████████ (Chief Engineer): As a licensed Chief Engineer, Mr. ██████████ had attended numerous safety courses designed for commercial fishermen. On board the FPV GALAXY, Mr. ██████████ generally described the safety training as watching video tapes, donning survival suits, and showing the crew where the rafts were located. With regards to fire drills, Mr. ██████████ stated that engineering department actually did not conduct fire drills. Although Mr. ██████████ was the on-scene leader for engine room fires, he personally never conducted fire fighting drills with the fire teams. Instead he provided instruction on fighting fires to his assistant, Mr. ██████████. With regard to man overboard drills, Mr. ██████████ stated that he had never practiced such a drill while on the FPV GALAXY, but there had been discussions about it and instruction provided. According to Mr. ██████████ the last safety instruction conducted on board the FPV GALAXY occurred on October 13, 2002. He stated that he had been excused from this training, but believed that the drills on October 13, 2002 consisted of watching safety videos and donning survival suits.

██████████ (Chief Engineer): As a licensed Chief Engineer, Mr. ██████████ had attended numerous safety courses designed for commercial fishermen. On board the FPV GALAXY, he stated that drills occurred once per fishing trip. He also stated he was usually excused from drills but that he "sat in on a few where we watched videos and instructed guys in what they were supposed to do in the event of an emergency." He stated that they had charged fire hoses and set them overboard but that he had never personally donned an SCBA or a fireman's outfit while on board the FPV GALAXY. He stated that he had not participated in man overboard drills or abandon ship drills because he was excused from attending the drills. He did state that he had provided instruction to some of the crew members on how to launch a liferaft.

██████████ (Assistant Engineer): Mr. ██████████ had been with the FPV GALAXY since January 1998 and had always served as the Assistant Engineer. Mr. ██████████ did not hold a U.S. Coast Guard license, but was a licensed motorman in Poland and had attended vocational safety training in Poland. He testified that every three months the crew was required to watch a safety video and don a survival suit. He could not recall the last time there had been a fire drill or abandon ship drill on the FPV GALAXY.

Deck Department

██████████ (Deck Boss): Mr. ██████████ stated he had been on the FPV GALAXY since January 1998. He was currently the deck boss, in charge of the six-person deck crew. Mr. ██████████ stated that he had never been to any formal classroom-type training specifically designed for commercial fishermen. All of his safety training had been onboard the FPV GALAXY. He stated that he had participated in donning a fireman's outfit and SCBA on or about October 13, 2002. Mr. ██████████ testimony indicated that he had participated in safety meetings and watched safety videos, which lasted about two hours.

██████████ (Assistant Deckboss): Mr. ██████████ had been fishing with the FPV GALAXY since September 1999. This was his first trip as the assistant deck boss. He had never been to a formal commercial fishing safety course. He testified that he had never practiced a fire drill on board the FPV GALAXY, but he had assisted others in the donning of the SCBA and fireman's outfit. Although he was designated as the person who would wear the SCBA and fireman's outfit during a fire, he had never practiced putting on the SCBA or the fireman's outfit. He stated that it was on his and Mr. ██████████ "agenda" to practice this training. Mr. Pigott stated that he had participated in man overboard and abandon ship drills while on the FPV GALAXY. He also stated that he had participated in abandon ship drills where they would have to jump from the top deck.

██████████ (Deck Department): Mr. ██████████ stated that he had never been to any formal classroom type training specifically designed for commercial fishermen and that he had been on the FPV GALAXY for two months. Mr. ██████████ stated that he had watched numerous safety videos while on the FPV GALAXY and seen "personal demonstrations by the mate or ██████████. He also stated that Mr. ██████████ would regularly quiz vessel personnel about their duties and assignments according to the WQSB. He stated that since being on the FPV GALAXY he had not practiced a fire drill, man overboard drill or an abandon ship drill.

██████████ (Deck Department): Mr. ██████████ had been fishing on the FPV GALAXY since August 2000 and was a member of the deck crew. Mr. ██████████ had attended a formal commercial fishing school at the Alaska Vocational Technical Education Center (AVTEC) in Seward, Alaska where he had safety training. He also had previous training as the rescue swimmer at the AVTEC facility. According to his testimony, Mr. ██████████ stated that he had practiced the donning of survival suits and watched safety videos every time before going fishing. He could not recall ever practicing an abandon ship drill. As a member of the fire team, he had practiced donning the SCBA and the fireman's outfit in the week prior to the accident.

██████████ (Deck Department): Mr. ██████████ had been working on the FPV GALAXY since September 1999 and it was the only fishing boat he ever worked on. On this most recent trip he was a member of the deck crew. Mr. ██████████ testified that he had never been to a formal commercial fishing safety course. He stated that the safety training on board the FPV GALAXY consisted of watching safety videos and donning survival suits at the start of each fishing trip. In addressing the mandatory monthly drill sheet he signed, Mr. ██████████

stated that the only training he went through before signing the sheet was to watch the safety videos and to receive instruction.

██████████ (Deck Department): Mr. ██████ has been working on the FPV GALAXY since October 2001. On this most recent trip he was a combi, a position which splits time between the deck department and the processing department. Mr. ██████ testified that he had never been to a formal commercial fishing safety course. According to Mr. ██████ the FPV GALAXY safety training consisted of watching video tapes and conducting hands on training for emergencies. He stated that they had conducted fire drills immediately after departing Dutch Harbor. He stated his responsibilities during a fire drill were to get blankets and to act as a messenger. However, according to the WQSB, Mr. ██████ responsibility was to assist the #1 hose team. He stated that he had participated in discussion of abandon ship drills.

██████████⁷ (Combi): Mr. ██████ had been working on the FPV GALAXY since August 2002. On this trip, he worked as a combi. Mr. ██████ stated that he had never been to a formal commercial fishing safety course. Mr. ██████ stated that he had received a safety orientation on the FPV GALAXY, but had not actually practiced donning a survival suit. He was familiar with his duties according to the WQSB. He stated he was a messenger and would bring extra fire fighting equipment to the scene.

██████████⁸ (Combi): Mr. ██████ had been working on the FPV GALAXY since August 2002. On this trip he worked as a combi. Mr. ██████ stated that he had never been to a formal commercial fishing safety course. Mr. ██████ stated that he had practiced putting on a survival suit and had received instruction on where to muster.

Processing Department

██████████ (Factory Foreman): Mr. ██████ had been working on the FPV GALAXY since September 1999. On this most recent trip he was the factory foreman and as such supervised fourteen people in the factory. Because most of the processing crew spoke Spanish as a primary language, Mr. ██████ (also a Spanish speaker) stated he ensured the processing crew was trained in what to do and where to muster in the event of an emergency. Mr. ██████ stated that emergency drills were conducted on the FPV GALAXY every trip. He stated the last two trips, once in Seattle (August 2002) and in Alaska (October 2002) emergency drills were performed. Mr. ██████ also stated that he had witnessed training where emergency fire equipment was donned by certain crew members.

██████████ (Assistant Factory Foreman): Mr. ██████ had been working with the FPV GALAXY since December 1998 and up until this last trip he had been a processor on

⁷ Mr. ██████ did not appear before the hearing. The comments provided here are not sworn testimony but come from a preliminary interview conducted on October 23, 2002 in Seattle, WA. The transcribed interview was entered as Coast Guard Exhibit 89 in lieu of sworn testimony.

⁸ Mr. ██████ did not appear before the hearing. The comments provided here are not sworn testimony but come from a preliminary interview conducted on October 23, 2002 in Seattle, WA. The transcribed interview was entered as Coast Guard Exhibit 91 in lieu of sworn testimony.

the FPV GALAXY. During this last trip he was the assistant factory foreman. Mr. [REDACTED] stated that the last emergency training on the FPV GALAXY that he attended was just after completing the last offload in Dutch Harbor. He stated the training consisted of donning survival suits and watching three safety video tapes. He stated that he had attended training on board where he practiced putting on an SCBA. Mr. [REDACTED] stated that he was responsible for instructing the processing workers on what they are supposed to do in the event of an emergency.

[REDACTED] (Processor): Mr. [REDACTED] stated he had been fishing on the FPV GALAXY since September 1998 and was a processor on the last voyage. He had never been to a formal commercial fishing safety course. Mr. [REDACTED] stated that most of the safety training he had participated in during his four years on the vessel had been emergency signal recognition, donning of survival suits and learning where to muster. He stated the vessel did not have safety drills every month, but every season. He stated he could not recall the last time there had been an abandon ship drill and then qualified his statement by saying that he “does not pay attention to that sort of stuff.”

[REDACTED] (Processor): Mr. [REDACTED] had been working on the FPV GALAXY since August 2002. Mr. [REDACTED] testified that the emergency training on the FPV GALAXY consisted of practicing donning survival suits, watching safety videos, alarm identification, and where to muster. Although he was a Spanish speaker, he stated that he could understand the safety videos “by their facial movements...(and) by the gestures.” He stated he felt that safety videos overdubbed in Spanish would be better.

[REDACTED] (Processor): Mr. [REDACTED] had been working with the FPV GALAXY since December 1999. He was employed on board as a processor. Mr. [REDACTED] stated the last safety training he participated in on board the FPV GALAXY was to watch safety videos and to don a survival suit in less than 60 seconds. He stated that during that safety training, they did not practice a fire drill but they did discuss man overboard procedures.

[REDACTED] (Processor): Mr. [REDACTED] had been working with the FPV GALAXY since December 2000 and had been a processor the entire time he was on the FPV GALAXY. He stated that had never attended any formal safety training for commercial fishermen and all of his safety and emergency training was on the job. Mr. [REDACTED] stated that emergency training and drills were held at the start of each season and didn’t recall the last time the safety training had been conducted. The safety training consisted of watching video tapes and donning a survival suit. Mr. [REDACTED] stated that crew members signed the “Mandatory Monthly Drill” sheet indicating that they had donned a survival suit. Mr. Flores stated that the crew did not practice fire drills or abandon ship drills, but that they would receive instruction from the foreman on what to do in the event of a fire and where to go in the event of abandoning ship. He also stated that there had been some training regarding the different types of alarms on board.

[REDACTED] (Processor): Mr. [REDACTED] had been working with the FPV GALAXY since December 2001 and had been a processor the entire time he was on the FPV GALAXY. Mr. [REDACTED] stated that emergency training was conducted following the last port call and consisted

of watching safety videos and donning survival suits. He stated they did not conduct a fire drill or an abandon ship drill, but watched the videos on how to perform those activities. He stated that although he signed the "Mandatory Monthly Drill" sheet, no one ever explained to him what he was signing. He stated he just signed it after watching the safety videos.

██████████ (Processor): Mr. ██████████ had been working with the FPV GALAXY since February 2002 and had been a processor the entire time he was on the FPV GALAXY. Mr. ██████████ stated that the emergency training on board the FPV GALAXY consisted of watching safety videos and donning a survival suit. He was familiar with his duties on where to evacuate to in the event of an emergency. He could not recall whether there had been safety training following the vessel's departure from Dutch Harbor, but he knew that he had participated in safety training either during the departure from Seattle or the departure from Dutch Harbor.

██████████ (Processor): Mr. ██████████ had been working with the FPV GALAXY since February 2002 and had been a processor the entire time he was on the FPV GALAXY. He had never attended any formal safety training for commercial fishermen. Mr. ██████████ recalled that emergency training was conducted on board the FPV GALAXY on every trip and it consisted of donning survival suits and watching safety videos. He stated that he did not understand the safety videos because they were in English and that he did not understand English. He stated that while he was aware of a list assigning duties during an emergency, he had never looked at the list to see specifically what he was supposed to do. He stated that no one on board had ever told him what to do in the event of a fire.

██████████ (Processor): Mr. ██████████ had been working with the FPV GALAXY since August 2002. This was his first trip and he was a processor. Mr. ██████████ had not attended any formal commercial fishing vessel safety training. Mr. ██████████ stated that the emergency training he attended on board the FPV GALAXY consisted of donning survival suits and watching safety videos.

Hotel Staff and NMFS Observer

██████████ (Assistant Cook): Mr. ██████████ had been working with the FPV GALAXY since November 1998. He was the assistant cook. Mr. ██████████ had not attended any formal commercial fishing vessel safety training. Mr. ██████████ stated that safety training and drills were provided every time the vessel went fishing. The safety training consisted of watching safety videos and putting on survival suits. He stated that fire drills consisted of discussions regarding what his responsibilities were in the event of an emergency. Mr. ██████████ stated that he never had actually performed his assigned duties during a fire drill, he had only discussed what those duties were. He stated that they had practiced man overboard drills beyond simply discussing what needed to be done. However, when asked if the crew had actually gone out on deck to practice the drills, he stated that he did not remember doing that.

██████████ (NMFS Observer): Ms. ██████████ had been assigned to the FPV GALAXY for approximately one week. As a NMFS Groundfish Observer, she had been given an eight-

hour fishing vessel safety course as part of her observer training. This training included classroom training as well as hands-on use of safety equipment and survival suit / liferaft training. Ms. [REDACTED] testified that Mr. [REDACTED] provided her with a “not very extensive” safety orientation on October 12, 2002. She stated that she did not participate in any emergency drills while she was on board the FPV GALAXY but she was familiar with her duties according to the WQSB. Her assigned duty, according to the WQSB, was to report to the wheelhouse for all emergencies.

11. DESCRIPTION OF CASUALTY

The description of the casualty is based upon the testimony provided by 34 separate witnesses during public hearings conducted in Seattle, Washington from December 9-18, 2002 and January 21-24, 2003. Additional information has been drawn from various documents submitted as exhibits during these hearings. This section documents the key actions and activities that led up to and occurred on the FPV GALAXY on October 20, 2002.

This chapter describes a complex series of events that takes place in multiple locations on the vessel. Although the testimony provided by the witnesses describes the same key events, the testimony as to what order events occurred is sometimes contradictory. The testimony of each witness has been exhaustively reviewed. From this review a single timeline has been chosen in which to describe the events, recognizing that some witnesses recall the same events in a different order. Because of the complex nature of this incident and the numerous points of view experienced from differing vantage points, the description of the casualty is organized using several reference points: events as they occurred on the vessel, events describing the rescue and recovery, and events which occurred following the rescue and recovery.

On the Vessel (Part One): The first section, pages 55-70 is an estimated timeline that begins on August 1, 2002 and ends on October 20, 2002 at 1635 Alaska Standard Time.⁹ The endpoint for this part (1635) is the last known time reference on board the FPV GALAXY during the incident and generally coincides with Captain [REDACTED] MAYDAY. All times provided in this section are general estimates based upon the testimony of the crew.

On the Vessel (Part Two): The second section, pages 71-85, covers the period from the MAYDAY until the U.S. Coast Guard helicopter arrived on scene at 1918. During this period there is no external reference to determine the passage of time. Events occurring on the vessel after the MAYDAY are generally organized in chronological order, but more specifically are organized based upon the events as they occurred in the different locations on the vessel. As such, there are some overlaps in time and description.

Rescue and Recovery: The third section, pages 86-91, describes the events which occurred in response to the MAYDAY by the U.S. Coast Guard and the Good Samaritan vessels which assisted in the rescue and recovery of the crew. Because there was a known time reference for these events, a precise timeline is provided.

Aftermath: The fourth section, pages 92-94, covers the events following the rescue of the crew.

⁹ All future time references are Alaska Standard Time.

a. ON THE VESSEL (PART ONE)

August 1, 2002: The FPV GALAXY departed Seattle, WA to fish for Pacific cod in the Bering Sea on what was planned to be a 3-4 month fishing trip. Safety training and some emergency drills were conducted and logged on this day. All hands signed the Mandatory Monthly Drills sheet. The Chief Engineer, [REDACTED], signed the sheet, but in testimony stated that he was excused from participating in the training and drills on this date.

August 23, 2002: The port side generator's windings failed on or about August 23, 2002. The port side generator was powered by a Caterpillar 3408 diesel engine. The problem was first noted when the hotel power flickered and then failed. The engineer on watch, Mr. [REDACTED] was in the reefer space at the time the power flickered and immediately ran forward to the engine room. When he arrived he found the engine room filling with black smoke and noted that the port side generator was arcing and sparking. He immediately shut down the port side generator using the emergency shutdown on the prime mover. Ship's power was restored within five minutes using the starboard side generator. The arcing or sparking did not cause a secondary fire within the engine room. Additionally, the generator failure did not affect any sources of fuel on the generator or the vessel's day tanks.

August 23, 2002: The Chief Engineer on the FPV GALAXY contacted the home office at Aleutian Spray Fisheries, Inc. and made arrangements with the port engineer, Mr. [REDACTED] to find a new or rebuilt generator that would be available to the vessel during its offload in Dutch Harbor during the 2nd week in October. The damaged generator was not operated for the remainder of the trip.

October 10, 2002: The FPV GALAXY arrived in port and offloaded approximately 1.2 million pounds of cod at the Western Pioneer Dock in Dutch Harbor. There were two crew changes. Mr. [REDACTED] relieved Mr. [REDACTED]. In addition, a new NMFS observer, Ms. [REDACTED] reported aboard the vessel. There were no other crew changes. Ms. [REDACTED] was given a safety orientation of the vessel by Mr. [REDACTED] with no discrepancies noted.

October 11, 2002: A random drug test of all crew members, with the exception of [REDACTED] was conducted. All test results were negative.

October 11-12, 2002: Mr. [REDACTED] and Mr. [REDACTED] removed the damaged port side generator. To bring in the new generator, the mountings in the engine room had to be slightly modified by the crew. Once this was accomplished, the new generator was put into place. The new rebuilt generator was a Caterpillar 350 KW generator, same as the original.

[REDACTED], a marine electrician from Harris Electric in Dutch Harbor, was contacted to complete the installation of the new generator by connecting the main leads to the existing switchboard and paralleling the new generator with the existing generators. Mr. [REDACTED] noted when he arrived that the engine room was well lit and orderly. He examined the switchboard and noted that he "didn't see any grounds indicated on the switchboard when I started work." The engineers on board had locked out and tagged out the switchboard and breakers and had already coupled the diesel to the generator. When Mr. [REDACTED] started the

engine for the port side generator, Mr. [REDACTED] noted that the low oil pressure alarm sounded as expected. Mr. [REDACTED] manually reset the alarm. Mr. [REDACTED] did not perform any other work to either the starboard or centerline generator. He departed the vessel at approximately 2145 on October 12, 2002. Mr. [REDACTED] noted the installation was a "typical" job.

October 12, 2002 @ 2200: The vessel departed out of Dutch Harbor and headed to the fishing grounds near St. Paul and St. George Islands to prospect for the best fishing.

October 13, 2002: Safety training was conducted for the crew on the FPV GALAXY by Mr. [REDACTED]. According to the general testimony provided in the hearing from multiple crew members, the all hands portion of the training consisted of watching 1.5 hours of safety video tapes and then practicing the donning of survival suits. Additional training and instruction for the fire teams, consisting of donning SCBAs and fireman's outfits was also conducted. Mr. [REDACTED], Mr. [REDACTED], and Mr. [REDACTED] testified to putting on SCBA gear and fire outfits during this training. Mr. [REDACTED] who was identified in the WQSB as being the member of the fire team who was required to don an SCBA, did not don an SCBA during this training. Mr. [REDACTED] stated that he was excused from these drills.

October 15, 2002: [REDACTED] U.S. Coast Guard issued license to serve as a Chief Mate expired.

October 13-20, 2002: The first several days of fishing were uneventful and not sufficiently productive for the master to concentrate on one area. Over a six-day period, the vessel had caught and processed approximately 80,000 to 100,000 pounds of product.

All subsequent time entries are for October 20, 2002. The vessel was actively fishing. Captain [REDACTED] came on watch at 0800 after the vessel had completed hauling up 11 miles of gear from the first set. Throughout the day the vessel was retrieving gear. There were no unusual occurrences reported during the day. The last gear was retrieved at approximately 1530-1545.

~1530 - 1545: The weather was coming out of the north – northeast, with seas at 12-15 feet with an occasional 20 foot wave. Skies were broken and intermittent with occasional snow squalls. Winds were out of the north – northeast at approximately 25-30 knots. The vessel held position for a period of time, to provide a stable platform to allow the processing workers to finish processing the catch on board.

~1545: The master proceeded to the next set of gear, which was approximately 1 hour (11 miles) steaming time away. The vessel was on a course of 270 degrees west with the engines running between 800-1000 RPMs and proceeding at approximately 11 knots.

~1555: Mr. [REDACTED] conducted a walk through of the engine spaces at 1555 while the vessel was proceeding to the next set of gear, and noted no problems at that time. Mr. Vielma testified that the following equipment in the engine room and refrigeration room were operating: port and starboard main diesel engines, the starboard side generator, which was running at an automatic adjusted load of 1800 RPMs, or 60 hertz. The fuel centrifuge was

operating and the settling tank that provides fuel to the centrifuge contained approximately 3000 gallons of diesel fuel. The line leading into the fuel centrifuge was not fully opened, but had a quarter turn on it. The day tanks contained approximately 700 gallons of diesel fuel in each tank. There were approximately 50,000 gallons of diesel fuel on board. The water pump to supply the factory with processing water (this pump also provided pressure for the fire main), the starboard side ammonia compressor, and various hydraulic pumps (forward of the processing spaces) to run the processing equipment and hauling gear were operational. Mr. [REDACTED] proceeded to the galley for lunch at 1555. The engine room was left unattended from approximately 1556 until approximately 1622.

~1600: Captain [REDACTED] contacted the deck boss, Mr. [REDACTED] and directed him to close the forward and aft hauling station doors and the stern gear setting hatches. This was done as part of routine operations that occurred prior to the vessel steaming to retrieve a new set of gear. The port side mooring station hatch was also secured. The watertight door leading from the engine room to reefer space was not secured, nor was the watertight door leading from the reefer space into the steering gear/tool room. It is not known whether the watertight door leading from the port side passage way into the fishing gear room was secured.

~1600: A crew shift was in progress and lunch was being served in the galley. Most crew members were in the galley and would end up being in the galley for the next half hour.

~1621: Several crew members who were eating lunch in the galley testified that a large wave impacted the starboard side of the vessel, aft of the gear hauling station. This caused the boat to roll 40 degrees to the port side and caused trays filled with food to be thrown about the galley. This wave was also noted by Captain Shoemaker in the wheelhouse.

~1622 (Various Locations): At approximately 1622, numerous crew members detected smoke on the vessel. Table (9) is a summary of the location of all personnel at that time

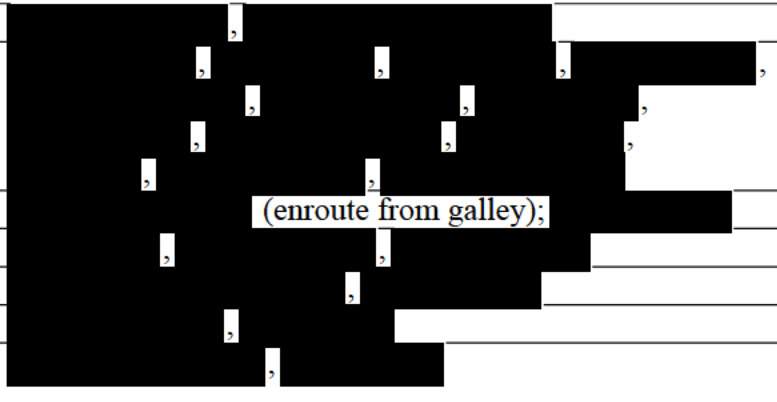
Wheelhouse	
Galley	
Factory	
Work Deck (Gear Line)	
Work Deck (Break Room)	
Work Deck (Factory Office)	
Pilot House Deck (Staterooms)	
Forward Main Deck	Unattended
Engine Room	Unattended
Top Deck	Unattended

Table (9): Summary of Personnel Location at Approximately 1622.

From all accounts provided, it appears that the smoke was detected on multiple decks almost simultaneously. The descriptions of the smoke from these numerous accounts are varied, but most observations indicate that smoke was initially white/grey and wispy, and was followed by smoke that was thick and black within one minute.

~1622 (Wheelhouse): Almost immediately following initial detection of the smoke by the crew members on the lower deck, the assistant factory foreman, [REDACTED], who was in the wheelhouse providing a tally of the last shift's production, saw smoke coming through a screw hole in the wheelhouse and directed Captain [REDACTED] attention to it.

Captain [REDACTED] ordered Mr. [REDACTED] to find the "Chief," Mr. [REDACTED]. Captain [REDACTED] initially seeing the smoke coming from the bulkhead, which is common to the fidley, then looked down at the floor and noted smoke was rising from the deck and carpet seams of the wheelhouse. Captain [REDACTED] immediately pulled the fire alarm.

Fire Teams Respond

~1622 (Galley): Upon hearing shouts of “smoke” and “fire” coming from the work deck, numerous crew members raced down from the galley and the port side work deck to the gear line on the starboard side of the vessel. Several other members of the fire team reported to this location. Once on scene, several crew members reported seeing smoke in the overhead in the vicinity of the starboard upper engine room hatch. Table (10) below, derived from the WQSB, lists the fire teams, their responsibilities and to where they responded. Crew not on the fire team were supposed to report to their muster stations as directed by the Chief Mate.

Name	Fire Team Position	Actual Response
[REDACTED]	O/C Bridge / Comm	O/C Bridge / Comm
[REDACTED]	On Scene Leader (Engine Room)	Reported to scene. Assessed fire, donned SCBA #2, served as own messenger, attempted to discharge fixed CO2 system.
[REDACTED]	On Scene Leader (All other spaces)	Reported to scene. Initially assisted C/E, made entry into upper engine room, ventilated gear line, remained on scene.
[REDACTED]	#1 Hose Team	Reported to scene. Assessed origin of fire, assisted C/M, donned SCBA #1, ventilated gear line, remained on scene.
[REDACTED]	#1 Hose Assist	Reported to scene. Directed to ventilate main deck accommodations.
[REDACTED]	Don fireman’s outfit & SCBA #1	Reported to scene. Directed to ventilate main deck accommodations.
[REDACTED]	Bring SCBA #1	Reported to scene. Brought SCBA #1, remained on scene.
[REDACTED]	Don fireman’s outfit & SCBA #2	Reported to scene. Brought extinguisher, assisted in accommodation space evacuation, and evacuated to top deck.
[REDACTED]	Bring SCBA #2	Reported to scene. General assistance, evacuated to top deck.
[REDACTED]	Secure Hydraulics / Electricity	Reported to scene. Assisted C/E, ventilated main deck accommodations, attempted to install E/R ventilation covers.
[REDACTED]	Bring Extinguisher	Did not report to scene. Evacuated to top deck.
[REDACTED]	Head Count	Unknown.
[REDACTED]	Bring Extinguisher / Messenger	Did not report to scene. Evacuated to top deck.
[REDACTED]	Bring Extinguisher / Alt Messenger	Did not report to scene. Evacuated to top deck.
[REDACTED]	Fire	Reported to scene. Provided general assistance, evacuated to top deck.

Table (10): Fire Team Duties and Actual Response

Mr. [REDACTED] and Mr. [REDACTED] noted that the fire teams were already breaking out fire hoses. Mr. [REDACTED] told them he did not need hoses because he thought he had an electrical fire. Several members of the crew / fire team noted hearing the fire alarm activate at this point.

~1623 (Aft Work Deck): Mr. [REDACTED] quickly proceeded aft heading towards the aft lower level entrance to the engine room, by way of the gear line, looking for a source of the smoke. Mr. [REDACTED] also was checking the gear line. After approximately one minute the lights began to flicker and droop. The hotel power then went out completely and the emergency lights activated.¹⁰

Mr. [REDACTED] raced down one more deck into the engine room by way of the reefer space. He was followed into the reefer space by Mr. [REDACTED]. Upon coming to the watertight door between the reefer space and the lower engine room, Mr. [REDACTED] stopped and noted that the engine room appeared to be full of black smoke. There was an emergency light located directly above this entrance. Mr. [REDACTED] testified the light was not visible due to the smoke. The entrance to the engine room is approximately 12-16 inches away from the aft portion of the port side generator. From that vantage point Mr. [REDACTED] did not see any arcing or sparking coming from the generator nor did he feel any heat. He was wearing everyday, non-protective clothing and not wearing an SCBA. Mr. [REDACTED] could not state with certainty whether the starboard side generator was still running. He stated that there was no smoke in the refrigeration space.

Mr. [REDACTED] then decided to get portable CO2 extinguishers and SCBAs from one deck up. It was his intention to return to the engine room to attempt to fight the fire. Mr. [REDACTED] attempted to call to the wheelhouse using the vessel's intercom located aft of the refrigeration space, but the phone was dead.

~1623 (Wheelhouse): Captain [REDACTED] was alone in the wheelhouse. He attempted to contact the Chief Engineer and the Chief Mate using the vessel's "A" phone without success. He noted the wheelhouse filling with smoke and he noted the lights beginning to flicker and droop. At this point, he began to back down on the engine. Approximately a minute after the lights began to droop, the vessel's power failed and Captain [REDACTED] backed down further on the vessel's engines. He checked his radios and again attempted to raise the Chief Engineer and the Chief Mate using the vessel's "A" phone without success.

He then departed the wheelhouse from the port side passage way leading into the accommodation spaces and began pounding on the pilot house deck's stateroom doors to wake anyone who might be asleep. He quickly returned to the wheelhouse after finding no one in those staterooms.

Table (11) on the following page is a location summary of all crew members at approximately 1624.

¹⁰ When power was lost, the power ventilation into the engine room was shut down and the vessel lost steering.

Wheelhouse	[REDACTED]
Galley	Unattended
Factory	Unattended
Work Deck (Starboard Side)	[REDACTED]
Work Deck (Port Side)	[REDACTED]
Pilot House Deck (Staterooms)	Unattended
Lower Accommodation Deck	Unattended
Engine Room	Unattended
On or Enroute to Top Deck	[REDACTED]

Table (11): Summary of Personnel Location at Approximately 1624

~1624: (Work Deck) Mr. [REDACTED] returned to the starboard upper engine room hatch and noted black smoke coming from the hatch. He also noted that the hatch was not fully secured but had only one dog turned.

~1624: (Lower Engine Room) Mr. [REDACTED] who was the last one out of the engine room, did not close either the watertight door separating the engine room from the reefer room, or the door separating the reefer room from the steering gear room. Mr. [REDACTED] and Mr. [REDACTED] ran back up one flight of stairs to the work deck to get the SCBAs. While Mr. [REDACTED] ran up the stairs to the work deck, Mr. [REDACTED] was at the top of the stairs. Mr. [REDACTED] testified that Mr. [REDACTED] yelled “We have a fire in the engine room; clear the decks.” Mr. [REDACTED] ran forward on the port side of the vessel, near the port side upper engine room hatch to put on his SCBA and Mr. [REDACTED] ran to the starboard side, near the gear line, to put on an SCBA. While Mr. [REDACTED] and Mr. [REDACTED] were in the lower engine spaces, the vessel’s fire fighting teams had already assembled along the starboard side gear line, in the vicinity of the starboard side upper engine room hatch. Several crew members noted black smoke coming from this hatch.

Mr. [REDACTED] ran back to the starboard side and noted the fire team of Mr. [REDACTED] Mr. [REDACTED] and Mr. [REDACTED] and others were assembled and donning the SCBA. He told the remaining crew members gathered in the vicinity to “Go topside...get out of here.” Mr. [REDACTED] stated he did not clarify whether to go to the forward main deck or to the top deck.

~1624 (Wheelhouse): The wheelhouse was completely filled with black smoke. Captain [REDACTED] ran to the starboard side of the vessel and was heading to the starboard side emergency escape hatch which led up to the top deck. As Captain [REDACTED] moved past the chart table he heard a noise which he described as sounding like a “thump” or a “woofing” sound emanating from the fidley. As he moved past the chart table, he went past

his stateroom, which was half filled with heavy black smoke. He closed the door to the stateroom as he went past. He ran up a short flight of stairs and exited the wheelhouse from the emergency escape hatch on the starboard side of the vessel. He noted at this point there were people already beginning to come up onto the top deck of the vessel. He also noted there was a tremendous amount of smoke rising from the exhaust area and the port side of the vessel. He directed some crew members to hold open the hatch leading back down into the wheel house and then instructed [REDACTED], who was on the top deck, to act as a messenger and find out what the fire team was doing. Captain [REDACTED] then re-entered the wheelhouse. [REDACTED] did not go below as directed, but remained on the top deck due to smoke.

~1624 (Aft Top Deck): At this time, non-essential personnel were quickly evacuated to the top deck. As the crew members who had been on the work deck passed through the main deck and galley, they told the crew remaining there to evacuate to the top deck.

~1624 (Work Deck Starboard Side): On the starboard side of the vessel, in the immediate vicinity of the starboard side upper engine room hatch, seven crew members remained. While there are somewhat differing accounts of events among these six surviving crew members, it is apparent that several key events took place at this juncture.

Two crewmembers, [REDACTED] and [REDACTED] testified that Mr. [REDACTED] opened the starboard side upper engine room hatch and made a brief entry into the space. Mr. [REDACTED] indicated that a "thick stream of smoke came out" from the space when the hatch was opened by Mr. [REDACTED]. Mr. [REDACTED] stated that Mr. [REDACTED] made entry into the space wearing an SCBA and that he saw flames in the upper engine room coming up from the lower engine room level and going up the fidley space.¹¹ When Mr. [REDACTED] came out of the space, Mr. [REDACTED] testified that Mr. [REDACTED] stated the fire was "too much" and he was directed "to go up." At approximately the same time that Mr. [REDACTED] was reported to have opened the upper engine room hatch, Captain [REDACTED] heard a loud whooshing of air in the fidley which was followed by a significant amount of smoke pouring into the wheelhouse.

~1624 (Main Deck Port Side): At the same time on the main deck on the port side, Mr. [REDACTED] assisted Mr. [REDACTED] in donning the SCBA in the immediate vicinity of the port side hatch to the upper engine room.¹² Mr. [REDACTED] noted black smoke coming from the port side hatch to the upper engine room. Around this time, an unidentified person ran by shouting that a hatch had been opened. Mr. [REDACTED] shouted not to "open the hatches" and then directed Mr. [REDACTED] to evacuate the interior of the vessel. Mr. [REDACTED] then ran over to the starboard side of the vessel and proceeded one deck up, exiting the superstructure of the vessel from the port side door which leads to the forward main deck.

~1625 (Main Deck Port Side): Within seconds after seeing smoke coming from the port side hatch, Mr. [REDACTED] made the decision the fire was too large to fight with fire extinguishers and SCBAs. He testified at that point he knew that "I got to throw the fixed CO2." Mr. [REDACTED] then ran to the wheelhouse, located two decks up, to notify Captain [REDACTED] that

¹¹ Mr. [REDACTED] and Mr. [REDACTED] testified that Mr. [REDACTED] was wearing the SCBA.

¹² Mr. [REDACTED] had reported to the engineering office following being awoken by the fire alarms.

he was going to activate to CO2 system.¹³ Mr. [REDACTED] did not communicate his intent to the other fire fighting team on the port side of the vessel.

~1625 (Main Deck Starboard Side): [REDACTED] and [REDACTED] provided testimony that [REDACTED] believed the vessel's CO2 system had been activated. Mr. [REDACTED] testified, "[REDACTED] verbally said, you know, the CO2 was—or he said something to the effect the CO2 had been discharged..." Mr. [REDACTED] testified that "[REDACTED] exact words were 'Fuck, Chief pulled the CO2.'" Their testimony as to why they thought that Mr. [REDACTED] believed the CO2 system had been activated was because the engines had been backed down (and no longer appeared to be operating) and also because they heard a loud "click" sound coming from the engine room. Neither Mr. [REDACTED] or Mr. [REDACTED] reported hearing the 120 decibel CO2 alarm in the upper engine room sounding, nor did they report hearing or seeing the audio/visual strobe alarm activating. This alarm was located on the bulkhead in the immediately adjacent passage way. In fact, both claimed it was very quiet at the time. Following this determination by Mr. [REDACTED] the following activities occurred:

- Ventilation of the Main Decks: Mr. [REDACTED] directed two crew members to go one deck up and open the lower level accommodation doors which open up onto the forward main deck to ventilate the smoke. Mr. [REDACTED] and Mr. [REDACTED] followed these orders and went up one deck to open the doors. Mr. [REDACTED] went to the port side door, and Mr. [REDACTED] went to the starboard side door. Mr. [REDACTED] joined Mr. [REDACTED] at the port side door.
- Evacuation of Non-Essential Personnel: Mr. [REDACTED] and Mr. [REDACTED] evacuated to the top deck.
- Fire Team: Mr. [REDACTED] and Mr. [REDACTED] remained below with Mr. [REDACTED]
- Smoke Becomes Overwhelming: The smoke began to overwhelm the three fire team members on the gear line. Mr. [REDACTED] directed Mr. [REDACTED] to run forward to open the hatch into the hauling station, which opens to the exterior of the vessel. The three fire team members then immediately proceeded to the stern of the vessel and opened the gear setting hatch. According to testimony, the purpose of opening the two hatches was no longer to ventilate the space but instead to get air for the fire team and provide a possible evacuation route. The fire team members hung their upper bodies out of the gear setting hatch and called up to the crew now on the top deck for lines to be lowered so they could evacuate the space.

~1625: (Wheelhouse) Mr. [REDACTED] entered the wheelhouse wearing an SCBA and told Captain [REDACTED] that he had to discharge the vessel's CO2 system. Captain [REDACTED] replied "Go ahead and trigger it...Make sure no one is in the (engine) space." Once the master was notified, Mr. [REDACTED] then raced back down to the work deck and ran into the CO2 room to discharge the system into the engine space.

¹³ According to testimony provided by both Chief Engineers (Mr. [REDACTED] and Mr. [REDACTED]) the policy on the FPV GALAXY was that the master needed to be notified prior to discharging the vessel's CO2 system.

Explosion

~1626 (Gear Setting Hatch) A photo of the gear setting hatch is provided in Figure (17) below. The three fire team members were positioned at the gear setting hatch, trying to get fresh air. [REDACTED] testified that the fire team members knew they were in a bad situation. They were in the process of attempting to evacuate the space by climbing up the stern of the vessel with lines provided by the crew on the top deck. Mr. [REDACTED] and Mr. [REDACTED] testified that they had made contact with Mr. [REDACTED] who was in the process of retrieving lines for them. Mr. [REDACTED] was standing on the starboard side of the hatch, Mr. [REDACTED] in the middle, and Mr. [REDACTED] on the port side. Mr. [REDACTED] was standing on a table with his waist just above the level of the hatch. Mr. [REDACTED] and Mr. [REDACTED] testified that both Mr. [REDACTED] and Mr. [REDACTED] stepped back to grab the SCBA and then set it on the baiting table and were returning to hang out the hatch. Mr. [REDACTED] and Mr. [REDACTED] were immediately adjacent to the hatch, but not leaning out of it when an explosion occurred violently ejecting all three from the vessel and into the water.



Figure (17): Photo of Gear Setting Hatch taken December 2001

Mr. [REDACTED] stated that the explosion sounded like a “pop” and that his “body was just put through the most intense feeling I’ve ever felt in my life. There was so much pressure behind me.” Mr. [REDACTED] testified that “the explosion sounded like a gunshot, and it felt like an explosion mostly just air and percussion and heat. No initial flame hit us. Just really warm

air just blew us out.” Table (12) below is a location summary of all crew members at approximately 1626 when the explosion occurred.

Wheelhouse	[REDACTED]
Galley	Unattended
Factory	Unattended
Work Deck (Gear Setting Hatch)	[REDACTED]
Work Deck (Port Side)	[REDACTED] (CO2 Room)
Pilot House Deck (Staterooms)	Unattended
Forward Main Deck (Starboard Side Hatch to Weather Deck)	[REDACTED]
Forward Main Deck (Port Side Hatch to Weather Deck)	[REDACTED], [REDACTED].
Engine Room	Unattended
Top Deck	[REDACTED]

Table (12): Summary of Personnel Location at Approximately 1626

~1626 (Wheelhouse): After Mr. [REDACTED] departed the wheelhouse, Captain [REDACTED] opened up the port side window and walked to the starboard side of the wheelhouse. He testified that he was being overcome with smoke when the explosion occurred. Captain [REDACTED] testified that the explosion shook the vessel with such force he thought that it may have ruptured the hull. When Captain [REDACTED] felt the explosion, he immediately rushed out onto the top deck to get air and to see what had happened.

~1626 (Aft Top Deck): Crew members on the top deck reported hearing or feeling the explosion and several did not. Several crew members reported seeing the men thrown from the vessel. They immediately called out “man overboard” and began throwing lines, buoys, and other buoyant objects into the water.

~1626 (Forward Main Deck): Immediately prior to the explosion, Mr. [REDACTED] who was holding open the starboard side hatch leading to the forward main deck, reported that the smoke changed from a very black color to a white or yellow-whitish color. Mr. [REDACTED] also stated that air rushed past him. "It was just a massive, almost like an implosion, because it was like it took a big breath before it blew." Following the explosion, Mr. [REDACTED] reported a significant amount of debris (ceiling tiles, door frames, paper) being ejected from the passageways. The force of the blast knocked down Mr. [REDACTED] who was standing at the open hatches leading from the interior main deck to the forward main deck.

~1626 (CO2 Room): When the explosion occurred, Mr. [REDACTED] was attempting to activate the vessel's CO2 system in the CO2 room. The force of the blast caused him to be thrown

against the bulk head and he lost his flashlight. He reported seeing a fire ball move through the passageway, forward to aft, past the CO2 room. Mr. [REDACTED] then attempted to get back up to discharge the CO2 system, but was disoriented and could not successfully relocate the controls. Mr. [REDACTED] testified that he was certain that the vessel's CO2 system was not discharged

Man Overboard (MOB) Recovery from the Top Deck

~1627 (Forward Main Deck): Following the explosion, Mr. [REDACTED] evacuated the vessel interior (still wearing SCBA gear) by crawling through the work deck on his hands and knees. He located the stairs to the main deck, climbed up the stairs and then walked forward down the starboard passage way to the forward main deck. There he was able to walk outside and joined Mr. [REDACTED] Mr. [REDACTED] and Mr. [REDACTED]

~1627 (Top Deck and Wheelhouse): As soon as Captain [REDACTED] emerged from the wheelhouse, he quickly ran to the aft most portion of the top deck where the crew was screaming "man overboard." Upon seeing Mr. [REDACTED] Mr. [REDACTED] and Mr. [REDACTED] in the water 15-20 feet behind the boat, he instructed the crew to throw lines and buoys into the water (which they were already doing). He then sprinted back to the wheelhouse and put the engines in neutral. The three swam towards and were pulled back to the stern of the vessel. While they were immediately adjacent to the vessel, they were in great danger of being hit by the stern, which was pitching wildly in the 15-20 foot seas. Both Mr. [REDACTED] and Mr. [REDACTED] testified having to swim away and dive to avoid being hit by the stern. After putting the engines in neutral, Captain [REDACTED] raced back to the aft top deck and began directing the MOB recovery. Captain [REDACTED] began "getting everyone to specific buoys because I knew just how difficult it was going to be to lift these guys 30, 35 feet up." The following paragraphs describe the recovery of each person which went overboard:

- [REDACTED]: A line with a buoy was successfully thrown to Mr. [REDACTED]. He was able to straddle the buoy and was successfully pulled up the entire height of the vessel just forward of the starboard side mooring cleat. It took approximately 5-6 men to pull Mr. [REDACTED] up. Mr. [REDACTED] estimated he was in the water for approximately 2-3 minutes before being pulled from the water. He estimated it took another 2-3 minutes to be hauled up the side of the vessel.
- [REDACTED]: Was also able to get purchase of a line and was hauled up on the stern of the vessel. Mr. [REDACTED] estimates that he was in the water for approximately 2-3 minutes. Due to the significant pitching of the vessel, Mr. [REDACTED] began to swing out and then swung back into the hull of the FPV GALAXY with such force that he was, somehow knocked unconscious. According to the testimony of Mr. [REDACTED] Mr. [REDACTED] got knocked out and he let go of the line. Somehow his leg got tangled in the line and he did not fall back into the water. While Mr. [REDACTED] hung upside down by his leg, Mr. [REDACTED] with the assistance of several other crew members, was able to lower Mr. [REDACTED] back into the gear setting hatch that he had been blown out of just minutes before. Mr. [REDACTED] appeared back on the top deck several minutes after being lowered back into the

hatch. Mr. [REDACTED] has no recollection of how he got to the top deck. However, several crew members saw Mr. [REDACTED] emerge from the trunk on the top deck where the other crew members had evacuated from the superstructure just minutes before.

- [REDACTED]: Although all three fire team members were blown from the vessel at the same time and from the same location, it appears that Mr. [REDACTED] may have been seriously hurt during the explosion. Mr. [REDACTED] testified that Mr. [REDACTED] was the first one who was able to get into a life ring, and that the crew was able to haul him up out of the water about one - third of the way up the side of the FPV GALAXY. However, Mr. [REDACTED] could not hold on and fell back into the water. Captain [REDACTED] provided testimony that indicated that Mr. [REDACTED] did not appear to be swimming as strongly.

“ [REDACTED] didn’t seem that he had the same physical abilities that the other two did...he wasn’t kicking with the same desperation that I saw with [REDACTED] and [REDACTED] ...he was obviously hurt...in a situation like that I would have totally expected a lot more response from him in those conditions.”

Figure (18) shows the FPV GALAXY. Note the gear setting hatch on the stern directly beneath the “LA” in the vessel name and height from the waterline to the aft top deck.



Figure (18): Photo of the Stern of FPV GALAXY taken December 2001.

Collection and Donning of Survival Suits (Forward Main Deck)

~1627-1630 (Forward Main Deck): Immediately following the explosion, the three crew members on the forward main deck ([REDACTED], [REDACTED], and [REDACTED]) moved forward up onto the aft cargo hatch and began to retrieve survival suits from the survival suit bin located there. According to testimony provided, there were approximately 45 suits located in this bin. Within a minute following the explosion, Mr. [REDACTED] emerged from the starboard side hatch on the forward main deck wearing an SCBA. Following the explosion, the three crew members reported tremendous amounts of smoke billowing from the engine room ventilation ducts and from the hatches leading into main deck accommodation spaces. However, there still were no flames being reported at these locations.

Once on deck, Mr. [REDACTED] quickly learned from the assistant engineer that the remaining crew members were on the top deck. Mr. [REDACTED] then directed the other three crew members to put on their survival suits near the aft cargo hatch and then directed them to begin gathering suits for the crew members who were on the top deck. Based upon testimony, it was no longer possible to re-enter the vessel from the forward main deck due to the smoke and they were effectively isolated from the rest of the crew.

~1630-1633 (Top Deck and Wheelhouse): With the two crew members recovered out of the water, Captain [REDACTED] determined that he needed an SCBA if he was going to successfully make a MAYDAY from the wheelhouse. Captain [REDACTED] called [REDACTED] to him and stated he needed an SCBA. He then asked Mr. [REDACTED] for his red bandana. Mr. [REDACTED] departed Captain [REDACTED] general vicinity and initially attempted to retrieve an SCBA by way of the hatch from which the crew had just evacuated. However, due to significant amounts of smoke billowing from that hatch, Mr. [REDACTED] went forward and climbed down the starboard forward portion of the wheelhouse where there was a catwalk and then climbed down a ladder which leads down to the forward main deck. As he climbed down the side of the wheelhouse, Mr. [REDACTED] testified that he could hear Captain [REDACTED] attempting to make a MAYDAY call.

MAYDAY Transmission

~1633-1635 (Wheelhouse): After providing instructions to Mr. [REDACTED] Captain [REDACTED] returned to the wheelhouse and attempted to make a MAYDAY call. Upon re-entering the wheelhouse, he noted that the back of the wheelhouse and the chart table, where the radios were located, were glowing red hot. He also noted the wiring for the radios was burning. Nevertheless, he attempted to key both the Single Side Band (SSB) and the Very High Frequency (VHF) radios without success. He then went to the starboard side window to get air again and attempted to retrieve two handheld VHF radios that he had kept in his stateroom. The master's stateroom is located just aft of the wheelhouse on the starboard side of the vessel. Upon opening the door into the stateroom, which he had closed just minutes before, the stateroom burst into flames. He immediately dropped to his knees to avoid the flames that were in the overhead and scrambled on the deck to the desk in his room where the

radios were located. During this attempt to recover the radios, he bumped up against the bulkhead, which is common to the fidley, and sustained serious burns to his arm. The bulkhead was so hot that Captain [REDACTED] literally left behind the skin of his arm on the bulkhead. Unable to get the radios in the stateroom, he exited the space, crawling on his hands and knees, back into the wheelhouse. He went to the starboard window again for air and noted Mr. [REDACTED] floating/swimming in the water alongside the vessel.

Captain [REDACTED] then recalled that on the bulkhead next to the emergency escape hatch were three GMDSS radios and SART transponders.¹⁴ He grabbed the first radio and dove back over to the starboard side window and keyed the mike. He put out a full MAYDAY broadcast and then waited for a response. He received no response and surmised that the radio wasn't working. He threw the radio down to the deck and went back to get another. This time he accidentally knocked the second GMDSS radio to the deck and lost it in the smoke. Though intense smoke and heat filled the wheelhouse, and despite the fact he was choking and gasping for air, he located the third GMDSS radio on the bulkhead and then returned to the starboard side window. This time when he keyed the radio a green light came on and he made another MAYDAY call. Captain [REDACTED] testified that his MAYDAY was transmitted as follows:

MAYDAY, MAYDAY, MAYDAY. This is the fishing vessel GALAXY, fishing vessel GALAXY. We're in trouble. We've had explosions on board the vessel. I've got men in the water."

Upon releasing the mike, Captain [REDACTED] received confirmation from U.S. Coast Guard LORAN Station (LORSTA) St. Paul. Captain [REDACTED] relayed to LORSTA St. Paul that he was 30-35 miles southwest of St. Paul Island and then relayed that he had to leave the wheelhouse because he could not breathe. ETC [REDACTED], who was on watch at LORSTA St. Paul, recorded the time of the MAYDAY transmission as 1635 local time. ETC [REDACTED] gathered the critical information regarding the nature of the FPV GALAXY's distress and contacted the U.S. Coast Guard's Rescue Coordination Center (RCC) in Juneau, Alaska. In addition to LORSTA St. Paul receiving the MAYDAY broadcast, the F/V CLIPPER EXPRESS, which was taking on fuel in St. Paul also heard the broadcast. The master of the F/V CLIPPER EXPRESS, Mr. [REDACTED], recorded in his ship's log that the time of the MAYDAY was 1636.

While Captain [REDACTED] was making the MAYDAY broadcast, Mr. [REDACTED] testified that he was in the process of climbing down the starboard side of the wheelhouse onto the catwalk on the forward part of the wheelhouse. Mr. [REDACTED] testified that at that point in time he could see Mr. [REDACTED] in the water with a line on him and he could see Mr. [REDACTED] donning his survival suit.

Upon making a successful MAYDAY call and receiving confirmation from the U.S. Coast Guard LORSTA St. Paul, Captain [REDACTED] attempted to depart the wheelhouse. As he rushed out, he smacked into the fish finder and fell to his knees, dropping the radio. He desperately searched for the radio on the deck, but was not able to locate it again, and exited

¹⁴ GMDSS radios transmit on VHF channel 16.

the wheelhouse onto the top deck. When Captain [REDACTED] left the wheelhouse onto the top deck, the man overboard situation had only been partially resolved. Mr. [REDACTED] and Mr. [REDACTED] had been successfully recovered and were on the top deck, wet and cold in the 30 knot winds. Ms. [REDACTED] had given Mr. [REDACTED] her survival suit and he had put it on to get warm. Mr. [REDACTED] had made his way up to aft top deck through from the work deck hatch. He was shaking violently and several crew members testified that he was bleeding from his head and seemed very disoriented. The crew members on the top deck were exhausted after recovering Mr. [REDACTED] and Mr. [REDACTED] out of the water. Several had injured themselves with rope burns, cuts, and strains to their hands as they hauled the two out of the water. There were no additional survival suits on the aft top deck for the 20 crew members who were trapped there. As Captain [REDACTED] assessed the situation, he determined that the crew would have to abandon ship. He then set about to get survival suits for the remaining crew and began preparing to launch the liferafts.

Table (13) below is a location summary of all crew members at approximately 1636.

Wheelhouse	Unattended
Galley	Unattended
Factory	Unattended
Work Deck (Gear Setting Hatch)	Unattended
Work Deck (Port Side)	Unattended
Pilot House Deck (Staterooms)	Unattended
Engine Room	Unattended
In water	[REDACTED]
Forward Main Deck	[REDACTED]
Top Deck	[REDACTED]

Table (13): Summary of Personnel Location at Approximately 1636.

b. ON THE VESSEL (PART TWO)

Loss of [REDACTED]

The opportunity to recover Mr. [REDACTED] from the stern of the vessel was quickly lost. The vessel had lost power, she no longer had steering and the engines had been placed in neutral by Captain [REDACTED]. The vessel was essentially drifting in the current. Mr. [REDACTED] drifted with the vessel along the starboard side, approximately ten feet away from the hull. Captain [REDACTED] testified that he saw Mr. [REDACTED] floating in the water while he was in the wheelhouse attempting to make a MAYDAY. The crew members on the forward main deck ([REDACTED], [REDACTED], [REDACTED], [REDACTED], and later [REDACTED]) were in the process of collecting survival suits for the other crew members and donning their own suits. As Mr. [REDACTED] floated forward alongside the vessel, he was spotted by the four crew members who were forward of the wheelhouse. Mr. [REDACTED] acted immediately and threw a line and a life ring to Mr. [REDACTED]. Despite the howling wind blowing the line and the life ring around wildly, he was able to get a one inch line to Mr. [REDACTED] and Mr. [REDACTED] was able to loosely wrap the line around his right arm, but he was not able to tightly grab a hold of it. Mr. [REDACTED] then rolled face down into the water.

Mr. [REDACTED] directed Mr. [REDACTED] who was the FPV GALAXY's designated rescue swimmer, to jump into the water to assist Mr. [REDACTED]. Mr. [REDACTED] already had his survival suit fully donned. Mr. [REDACTED] gave a life ring to Mr. [REDACTED] and Mr. [REDACTED] jumped in.¹⁵ Mr. [REDACTED] quickly swam to Mr. [REDACTED] despite the 15-20 foot seas and racing current and was able to get Mr. [REDACTED] face out of the water. He was also able to get one of Mr. [REDACTED] arms partially inside the life ring. Despite his efforts, he could not get Mr. [REDACTED] securely in the life ring and Mr. [REDACTED] did not appear to be capable of assisting in his own rescue.

The two men in the water became exhausted. Testimony provided by various witnesses suggests that the two were in the water together for approximately 10-15 minutes. Captain [REDACTED] who was intently watching from the top deck and the top of the wheelhouse testified that at this point "[REDACTED] was lethargic... was totally non-reactive to any support and [REDACTED] was really struggling." Mr. [REDACTED] testified that "[REDACTED] was like in a state of shock. He never said nothing to me." Nevertheless, Mr. [REDACTED] continued to struggle and fight to rescue Jerry [REDACTED].

The two began to drift away from the vessel, so the crew on the forward main deck began to haul the line back in, with the life ring attached. Assisting in this was Mr. [REDACTED] who had run forward from the ladder and then forward to a hatch which led down to the factory space and gear hauling station. From the gear hauling station, Mr. [REDACTED] attempted to assist Mr. [REDACTED] and Mr. [REDACTED] back to the vessel by hauling in the line on the ring buoy. Mr. [REDACTED], Mr. [REDACTED] and Mr. [REDACTED] acting together were able to get the two within a few feet of the vessel. As the two got closer, however, the rolling of the vessel and the wave action made it extremely difficult to maintain a grip on the line. Because the line to the life ring

¹⁵ There is conflicting testimony as to whether Mr. [REDACTED] had a life ring or a line on him when he jumped in, however, it is clear that once he was in the water, he had both a life ring and a line

was so thin and because they had limited use of their hands due to the cold and the survival suits, the line would pay back out when the boat rolled and when waves would catch the two crew members. This scenario, where the men would get close to the vessel and then drift away again, occurred two – three times.

In what turned out to be a final attempt to control the paying out line, Mr. [REDACTED] put a wrap on the line using one of the rollers at the gear hauling station. However, the boat rolled suddenly away from the men due to the wave action. When the boat rolled, the line tightened and the ring buoy was pulled free from Mr. [REDACTED] and Mr. [REDACTED] grasp. Mr. Paniptchuk again valiantly attempted to hang onto Mr. Stephens, but he could no longer do so as the last of his strength failed him and he was now on the verge of losing his own life. Raul Vielma shouted over and over again at Mr. [REDACTED] stating “you got to stop, you got to stop, you got to stop. It’s over.” Captain [REDACTED] testified he could see white foam coming from Mr. [REDACTED] mouth. Mr. [REDACTED] rolled face down into the water and then floated away from Mr. [REDACTED] Mr. [REDACTED] was not seen by the crew again.

Launching of Rafts and Collecting of Survival Suits

While the attempted rescue of [REDACTED] played out, several critical activities were occurring on the top deck. Immediately after the MAYDAY was broadcast, Captain [REDACTED] turned his attention to preparing his crew to abandon ship. Realizing that most of the survival suits were now in a location inaccessible to the crew, he began to provide each crew member with alternate floatation.

He began by cutting poly-propylene and manila lines into one fathom lengths and having each crew member on the top deck tie these lines to their waists. Each crew member then secured LD2 and LD3 buoys to the lines. These buoys were made of a soft rubber, were florescent orange in color, were approximately 12” x 24”, and provide approximately 68 pounds of buoyancy. Another buoy of hard plastic construction was also tied to some of the crew members. These hard buoys are used when fishing in ice conditions, are approximately 20 inches in diameter, and are considerably heavier and are made of hard plastic. While most of the crew members topside were tying buoys to themselves, Captain [REDACTED] told them that they may have to abandon ship and ordered the starboard side liferaft to be launched.

The starboard side liferaft, which was on the windward side of the vessel, was the only raft that was accessible to the crew. The port side liferaft was fully engulfed in smoke and heat which was coming up from below decks and also getting blown across the ship from the starboard side.

The arrangement of the raft installation made it necessary for Captain [REDACTED] to gather several crew members to launch the raft. The starboard side liferaft was a 20-person Elliot model with a SOLAS A pack. The raft weighed 375 pounds and had the approximate dimensions of 64” x 23” x 23”. The raft was installed in a U shaped cradle of aluminum construction. The cradle is designed so that the raft must be lifted approximately 18 inches straight up to launch it. The raft was located adjacent to the starboard rail, which was

approximately 40 inches high. The rail was equipped with removable chain rails that could be unhooked and removed so that the raft could be passed through the rail without lifting the raft over the rail.

According to testimony provided by Captain [REDACTED] and Mr. [REDACTED] it took four people to lift the raft out of the cradle and launch it over the side because the raft was very heavy. The hydrostatic release was disconnected by the crew and the raft container thrown into the water. [REDACTED] "Chuy" [REDACTED] pulled the painter out of the canister hand over hand until the raft inflated. According to Captain [REDACTED] the raft opened "beautifully." The painter was secured to the starboard rail and the raft lay some 35 - 50 feet below the top deck of the FPV GALAXY, approximately in line with the forward face of the wheelhouse.

During the period of time Mr. [REDACTED] was in the water, Captain [REDACTED] stood on the top of the wheelhouse, on the starboard side, yelling to Mr. [REDACTED] and Mr. [REDACTED] for survival suits. They proceeded to run to the survival suit storage locker and gathered up several suits to be passed to the wheelhouse. After several attempts Mr. [REDACTED] was able to successfully throw a line to Captain [REDACTED]. The line had four survival suits tied to it. Mr. [REDACTED] swung the line and suits away from the front of the wheelhouse alongside the starboard side of the ship to protect the suits from the heat and smoke pouring from the superstructure. Captain [REDACTED] hauled the four suits up the starboard side of the wheelhouse, and then threw the four suits down to the top deck, giving them to an unknown crew member. Captain [REDACTED] issued specific instructions for two of the four suits: one suit would go to Mr. [REDACTED], who had just minutes before frantically told Captain [REDACTED] that he could not swim. The second suit would go to Mr. [REDACTED] who was injured and hypothermic from his fall overboard and subsequent recovery. The remaining two suits were passed to [REDACTED] and [REDACTED]. As Captain [REDACTED] worked to get his crew prepared, he explained to them that he had successfully transmitted a MAYDAY and that help would be arriving shortly. He also told them that "nobody goes off the stern of this boat" until he gave the command to do so. It was his intention to gather up more survival suits and then have an orderly evacuation from the stern with himself being the last person to evacuate from the stern.

While Captain [REDACTED] was preparing the crew to evacuate from the top deck, the four crew members on the forward deck gathered up another 5 suits, secured them to a line, and threw the line to the top of the wheelhouse. There was no one there to receive the lines initially, so the lines just lay there for a short period of time while Captain [REDACTED] had gone aft to assist in getting lines tied to people and buoys secured to the lines.

Sometime during the attempted rescue of Mr. [REDACTED] and the passing of the survival suits to the top deck, a second explosion occurred and the forward part of the wheelhouse erupted into flames. According to testimony provided by all the crew members on the forward main deck, the origin of the flames was the vents leading into the engine room and the two main deck hatches leading from the forward main deck into the superstructure of the vessel. The flames initially shot forward from the vents and the hatches approximately 25 - 40 feet and completely engulfed the forward section of the wheelhouse. The flames and the explosion forced Mr. [REDACTED] and Mr. [REDACTED] to run for cover on the forward part of the vessel. The

smoke and flames on the wheelhouse then increased dramatically. When Captain [REDACTED] returned to the top of the wheelhouse, the forward part of the house was engulfed in flames and several lines with suits tied to them were in place and were ready to be retrieved.

Recovery of [REDACTED]

After Mr. [REDACTED] slipped away, Mr. [REDACTED] was physically exhausted to the point that he was barely able to help himself. The crew on the forward deck had been screaming at him to swim aft toward the starboard side liferaft, which had been launched just minutes before, and was approximately 50 feet away. As he swam, he had a life ring with him and a one inch line that had been thrown by Mr. [REDACTED]. Mr. [REDACTED] swam aft towards the raft but stopped once or twice due to exhaustion. Mr. [REDACTED] and Mr. [REDACTED] assisted by pulling Mr. [REDACTED] aft towards the stern of the vessel. Mr. [REDACTED] eventually got to the raft, but did not have the strength to pull himself in. Realizing that Mr. [REDACTED] was exhausted and was in danger of losing his life, Mr. [REDACTED] raced forward to get another survival suit that fit better than his current suit and then raced back with the intention of jumping into the raft and assisting [REDACTED]. As he prepared to jump into the raft to assist Mr. [REDACTED] he told Mr. [REDACTED] and the others on the forward main deck to remain with the boat and to gather up all the survival suits and buoys they could and go to the bow of the vessel.

Mr. [REDACTED] then jumped from a height of 10-12 feet from the starboard side forward main deck into the raft. Once inside, the raft was being slammed and pinned against the hull of the FPV GALAXY by the 15-20 foot seas. Mr. [REDACTED] was alongside the raft, partially entangled in the boarding ladder and could not pull himself free and could not pull himself into the raft. Also, the life ring had somehow gotten tangled or otherwise attached to the raft. After several failed attempts, Mr. [REDACTED] successfully pulled Mr. [REDACTED] into the raft. Seeing both men in the raft, Captain [REDACTED] noted immediately that there was a line running forward to the rail on the starboard side of the ship that was holding the raft in place and not allowing the raft to be pulled aft. Captain [REDACTED] yelled repeatedly down to the raft telling the occupants to cut the line. In the raft, Mr. [REDACTED] looked frantically for a knife, but could not locate the knife (or could not reach the knife) which had come as survival equipment with the raft. Mr. [REDACTED] testified that although he knew the knife was in the raft, he could not locate it. He instead untangled the life ring from the raft. The life ring remained attached to the vessel.

With the raft now free from the line going forward, Captain [REDACTED], Mr. [REDACTED], [REDACTED] and Mr. [REDACTED] began to pull the raft by its painter towards the stern of the vessel. As the crew members on the top deck pulled the raft towards the stern, the seas, which were coming from the north, pinned the raft against the burning hot hull of the ship. Smoke filled the canopy of the raft, and the noise of the wind and the waves made it extremely difficult for the men in the raft to communicate with each other and with the crew remaining on the top deck.

Inside the raft, Mr. [REDACTED] worked desperately to put together the plastic paddles which came with the raft in order to use them to maneuver the raft aft. Mr. [REDACTED] found the

paddle parts to be duct taped together. Because his hands were so cold, and because the survival suit severely limited his manual dexterity, he had to rip the duct tape with his teeth before he could put the paddles together. Mr. [REDACTED] sought assistance from Mr. [REDACTED] but Mr. [REDACTED] was unable to provide assistance due to his exhaustion and was lying still on the floor of the raft. After several minutes, the crew on the top deck was able to begin moving the raft to the stern of the ship. Once Mr. [REDACTED] got the paddles put together he also assisted in moving the raft by paddling as hard as he could towards the stern. However, the raft paddles quickly broke.

Captain [REDACTED] Falls

Captain [REDACTED] had returned to the top of the wheelhouse shortly after Mr. [REDACTED] jumped into the liferaft. While he did not see Mr. [REDACTED] jump in, he did see him in the raft shortly after he jumped. Captain [REDACTED] focused his efforts on keeping the crew calm, getting more survival suits, and preparing them to abandon ship. The crew on the forward main deck testified that they had successfully thrown several lines up to the wheelhouse between the time Captain [REDACTED] had retrieved the first four survival suits, and when he returned to get some more suits. According to Captain [REDACTED] testimony, "there were many attempts made to keep continuing to throw lines." At that point a line was thrown by Mr. [REDACTED] which had gotten caught in the antenna in the center of the wheelhouse roof. Captain [REDACTED] raced over to that line, jumped up, and grabbed a hold of it. He started pulling the line up quickly, hand over hand, while at the same time leaning over the rail on the top of the wheelhouse to keep the line and five survival suits out of the flames and away from the superstructure's bulkhead. As he pulled up the line, he noticed that the line was on fire and that he was burning his hands badly. Nevertheless, he continued to haul the line hand over hand. Suddenly the line parted and Captain [REDACTED] lost his balance. He fell off the forward face of the wheelhouse onto the catwalk some 10 feet below. He reached out to catch himself by grabbing onto the blistering hot railing, burning his hands again. He landed on the catwalk facing the wheelhouse bulkhead where intense heat and flames were blasting out of the forward windows. The sweat pants he was wearing instantly ignited as he threw up his hands to protect his face. He then fell backwards over the catwalk rail and onto the extremely hot steel deck another 12 feet below. Captain [REDACTED] testified that he hit the deck so hard that it knocked both his shoes off when he landed. He landed on the deck on his left side between the vent intakes and vessel's condensers, breaking several ribs in the process. He then got up, favoring his left side. He had to roll / climb up onto the raised cargo hatch and then made his way forward to the crew members still remaining on the forward main deck.

The crew on the forward main deck (Mr. [REDACTED] Mr. [REDACTED] and Mr. [REDACTED] assisted Captain [REDACTED] in tending to his injuries and getting him into a survival suit. While Captain [REDACTED] desperately wanted to get back to the top deck to assist the crew members trapped by the fire, he was gently restrained by his crew. He could no longer assist the crew on the top deck due to his own severe injuries and due to the intense fire that was consuming the forward part of the wheelhouse. To make matters worse, the fire advanced in

the factory space below and the survival suit locker caught fire, effectively ruling out any possibility of the crew passing more survival suits to the top deck.

Redirecting his attention to the crew on the forward main deck, he prepared them to abandon ship. They evaluated the possibility of launching the 18 foot skiff, but determined it was impossible due to a lack of hydraulic power to operate the vessel's crane and also due to the "V" shape of the skiff's cradle, which made it impossible to slide the skiff off its cradle. The crew also took actions to protect themselves from the raging fire. They threw a 55 gallon drum of gasoline overboard which was stored near the survival suit locker, out of fear that it might ignite and spread the fire along the forward main deck. The four remaining crew members then tied A-4 buoys to their survival suits to make themselves more visible to potential rescuers and waited to be rescued.

Abandoning Ship from the Top Deck

In the confusion of the fire and smoke, getting survival suits passed out, and cutting fathom length lines and attaching buoys, only one of the 19 people on the top deck, [REDACTED], saw Captain [REDACTED] fall. Several crew members last saw Captain Shoemaker going forward towards the wheelhouse and did not see him after that. Many assumed he perished in the wheelhouse when he did not return. In the minutes leading up to and immediately after Captain [REDACTED] fall, Mr. [REDACTED] attempted to gather up several crew members to launch the port side liferaft. According to Mr. [REDACTED] testimony, he tried at least two times to launch the port side raft without success. He dropped the chains and released the hydrostatic release unit, but the raft was too heavy for him to launch by himself and he could not convince the other crew members to brave the flames and smoke.

When Captain [REDACTED] fell off the wheelhouse, Mr. [REDACTED] automatically became in charge of evacuating the crew from the top deck. Although he had only a limited ability to communicate with the crew on the top deck, he was the second in command on the FPV GALAXY and was the most experienced person on scene. All the other key personnel on board had either been lost overboard (Mr. [REDACTED] were incapacitated (Mr. [REDACTED] or were isolated from the top deck (Captain [REDACTED]. The starboard side raft at this point was located in the water on the stern of the vessel, drifting from centerline to port side, and secured to the FPV GALAXY by the sea painter. The stern of the FPV GALAXY was pitching severely, causing the raft to be lifted up onto the stern. The smoke from the ship also was pouring into the raft at a tremendous rate, making it very hot and difficult to breathe while inside the raft.

The situation on the top deck was extremely dangerous. The fire continued to spread throughout the superstructure of the vessel and began to move from the forward part of the top deck to the aft part of the top deck. Numerous crew members testified that the paint on the top deck was igniting, the deck was distorting and bubbling, and flames were beginning to shoot up through the deck. In addition, several crew members testified that a three to four foot brilliant blue flame ignited from the termination of the ventilation piping for the vessel's anhydrous ammonia system. This vent was located on the mast atop the wheelhouse

approximately 10 feet above the top of the wheelhouse. Several crew members testified that this venting was extremely loud. The crew pressed up against the aft most section of the top deck, towards the port side of the vessel where there was the least amount of smoke.

Mr. [REDACTED] initially called up to the crew, yelling for a knife. Based upon the testimony provided, there appears to have been a general disregard (brought on by a lack of communication) between Mr. [REDACTED] who was attempting to direct the top deck's evacuation efforts, and Mr. [REDACTED] and Mr. [REDACTED] who were on the top deck assisting in the evacuation.

According to the testimony provided by Mr. [REDACTED] and Mr. [REDACTED] Mr. [REDACTED] had yelled up to them, asking for a knife. They had refused his request, even though they each had knives. Mr. [REDACTED] stated,

"I ignored that command...to me he wanted to cut the painter...we got seventeen people up...you know, it didn't seem like the right move. Mr. [REDACTED] then relayed to the crew on the top deck at the time, "Nobody throws a knife down there right now."

Mr. [REDACTED] testimony reflected similar observations:

"[REDACTED] was asking for a knife to cut the painter line, and it wasn't presented to him. One of them (a knife) was on me and the other one was on [REDACTED]. We didn't know the guy's intentions at this time."

According to his own testimony, Mr. [REDACTED] was calling for a knife because earlier he had been unable to reach the knife in the raft and he wanted to make certain he had a knife available when it became necessary to cut the raft free from the burning vessel. When specifically asked why he thought a knife was not presented to him when he was frantically looking for one, he stated "I wish I know why nobody want to give me a knife. If in their...thinking that I was going to cut the painter...boy that's wrong."

There was also confusion as to whether or not Mr. [REDACTED] wanted the crew to jump. Mr. [REDACTED] stated that he recalled Mr. [REDACTED] shouting "No, don't jump!" and Mr. [REDACTED] testified that he heard the same thing: "Don't jump; don't jump." Mr. [REDACTED] later recalled that "I don't know the reason for that- - if there was a safety issue, the raft being burned against the vessel."

According to Mr. [REDACTED] testimony regarding this matter, he stated

"I was trying to locate a good place for them to jump. On the starboard side the boat was leaning too much and I was afraid they may land on the side of the hull". He further stated he ordered people to stop jumping due to smoke; "(I) didn't want him to jump because we were in a bad situation. It was hard for us to breath. I didn't want nobody else in the same situation. So I told him not to jump. Somebody else- - I don't remember who it was - he also make attempt to jump and I stop him."

When the raft was finally in a safe place for the crew to begin evacuating the vessel, the crew members were very hesitant to jump, despite the rapidly deteriorating situation on the top deck. Testimony indicates there were several reasons for this hesitancy. The jump they needed to make was approximately 35 - 50 feet; the seas were rolling through at 15-20 feet, making the raft an ever-moving target; Captain [REDACTED] last order to the crew on the top deck was not to jump until he gave the command to do so; and finally, of the 19 people on the top deck, only five had survival suits. Numerous crew members testified that they were very scared and did not initially have the courage to jump. Mr. [REDACTED] and Mr. [REDACTED] both testified that they continually yelled and screamed from below for the crew to jump. Once the raft was safely located in a position where the crew could safely jump, Mr. [REDACTED] pleaded with the crew members repeatedly in both Spanish and English, telling them to jump.

"Nobody wanted to jump. And I was losing strength because I was yelling so much, making signs, and I was telling them in English and Spanish 'jump.' But nobody jump."

It took several minutes for the first person to finally jump. [REDACTED] was the first person, followed by several others, most of whom jumped onto the top of the raft as directed by Mr. [REDACTED] Mr. [REDACTED] and Mr. [REDACTED] who had the only two knives on the aft top deck, were among the first crew members to jump into the raft. According to testimony provided by several witnesses, Mr. [REDACTED] and Mr. [REDACTED] initially landed in the water or bounced off the raft into the water and needed to be recovered. Mr. [REDACTED] fell into the water after making a final attempt to free up the port side liferaft. Mr. [REDACTED] testified as follows:

"...I went one last time to try to launch the other liferaft...the third (last) time I almost passed out from the smoke...I don't remember jumping over the rail; but I remember being under water."

When Mr. [REDACTED] was recovered from the water, he became instrumental in providing assistance in the raft, pulling people out of the water, moving the crew members to the outside of the raft, so as to make a larger and safer landing spot in the center of the raft, and cutting off the hard can buoys from the jumpers, so as to make for a softer landing.

Loss of [REDACTED] and [REDACTED]

Of the 19 people on the top deck, 14 eventually attempted to evacuate the vessel and 12 were successfully recovered into the raft. The two crew members who attempted to evacuate but were unsuccessful were Mr. [REDACTED] (a member of the processing crew) and Mr. [REDACTED] (the cook). As some of the crew members began to jump, one of the crew, Mr. [REDACTED], attempted to evacuate the top deck by lowering himself down the stern of the vessel using two lines he had found. According to the testimony of Mr. [REDACTED] (a member of the processing crew) and Mr. [REDACTED] (the assistant cook), Mr. [REDACTED] appeared to be panicking. Instead of jumping into the raft with the others, he secured two lines around the top rail of the vessel and then tied the lines around his waist. He then

attempted to lower himself to the liferaft some 35 - 50 feet below. Mr. [REDACTED] and Mr. [REDACTED] told Mr. [REDACTED] not to attempt this feat. Specifically, Mr. [REDACTED] stated,

"I told him twice not to tie himself up like that, because I was afraid that the line would get all tangled....I think maybe at that point he was already panicked."

When asked during testimony if anyone tried to talk Mr. [REDACTED] out of lowering himself down the side of the boat, Mr. [REDACTED] responded,

"Yes. We told him not to get over excited. I don't know what he was thinking. But he jumped when – I think when he saw the fire coming close."

As he lowered himself down the burning hot stern, Mr. [REDACTED] ran out of line and ended up about 8-10 feet above the waterline. Mr. [REDACTED] did not have a knife to cut himself free and the remaining crew members on the top deck did not have knives. The crew members on the top deck attempted repeatedly to haul Mr. [REDACTED] back to the top deck, however, the line was too thin for the crew members to get purchase. Attempts to untie the lines were also unsuccessful. As Mr. [REDACTED] hung from the stern, large waves hit him, causing him to spin and get further tangled. As he hung there, he repeatedly cried out for help.

From Mr. [REDACTED] point of view in the raft, Mr. [REDACTED] was in serious trouble. Mr. [REDACTED] testified,

"...at that moment the situation with [REDACTED] it was very bad, you know. I don't want to get into detail how [REDACTED] was feeling there, but he needed help bad. And I just couldn't find a way to help him. And the people on the top couldn't help him either."

He was getting pounded against the burning hull by the large waves that were rolling through. In addition, the lines that had been around Mr. [REDACTED] waist had moved up and were now around the lower portion of Mr. [REDACTED] chest, restricting his breathing. Mr. [REDACTED] tried desperately to find a knife to pass up to Mr. [REDACTED] but no one onboard the raft presented him with a knife.

In the time leading up to Mr. [REDACTED] unsuccessful evacuation from the vessel, Mr. [REDACTED] talked with Mr. [REDACTED] and Mr. [REDACTED], the vessel's assistant cook. Mr. [REDACTED] testified that Mr. [REDACTED] wanted Mr. [REDACTED] to jump first, so he could "see how I did it." As Mr. [REDACTED] helplessly watched and was occupied with Mr. [REDACTED] hanging on the side of the vessel, three people, Mr. [REDACTED], Mr. [REDACTED] and Mr. [REDACTED] all wearing survival suits, attempted to jump into the raft at approximately the same time. Mr. [REDACTED] jumped first and landed on top of the raft on his stomach, knocking the wind out of him. Mr. [REDACTED] jumped next and landed on top of the raft, but also hit Mr. [REDACTED] on the back with his arm, almost knocking him into the water. Both were safely pulled inside. Mr. [REDACTED] testified that he was still lying on top of the raft when Mr. [REDACTED] jumped.

Several crewmembers testified that Mr. [REDACTED] was the last person to jump for the raft. Ms. [REDACTED] described Mr. [REDACTED] had jumped from the vessel by placing one leg in front of the

other and then putting his arm up alongside his head.¹⁶ Mr. [REDACTED] who was standing next to Mr. [REDACTED] testified that at the precise moment Mr. [REDACTED] jumped, the raft drifted away towards the port side of the vessel and that Mr. [REDACTED] ended up in the water and then quickly drifted away in the opposite direction of the raft. According to Mr. [REDACTED] Mr. [REDACTED] intended to land on top of the raft, but instead landed about 5-7 feet away from the raft. In the space of 30 seconds, he had drifted 30-35 feet away from the liferaft and continued to drift with the current.

Mr. [REDACTED] also witnessed Mr. [REDACTED] jump and saw him fall into the water. Mr. [REDACTED] explained that when Mr. [REDACTED] jumped, the raft was on one side of a cresting wave and Mr. [REDACTED] was on the other side of the same wave. As the wave flattened out, the raft was blown by the wind towards the port side of the vessel and the current carried Mr. [REDACTED] along the starboard side of the vessel and away from the raft. Mr. [REDACTED] noted that when Mr. [REDACTED] landed in the water, he had his suit fully donned.¹⁷ Mr. [REDACTED] testified that he thought that Mr. [REDACTED] would have a chance to be recovered because he was wearing a fully donned survival suit.

Several crew members inside the raft testified that Mr. [REDACTED] was positioned in the entry way of the raft and was calling to them, looking for a line to throw to Mr. [REDACTED]. From the aft top deck Mr. [REDACTED] reported that he also saw a crew member, whom he identified as Mr. [REDACTED] trying to throw a short line to Mr. [REDACTED]. Mr. [REDACTED] further testified that he saw Mr. [REDACTED] with a line but,

“the line was too short and seas really rough and in no time, in a blink of the eye, he was far away from the raft. No way that they could get him.”

Based upon the testimony provided, it appears Mr. [REDACTED] was not attempting to use the buoyant quoit and thirty meter heaving line attached to the port entrance to the raft, but was instead using a one fathom line that had been retrieved from a crew member in the raft. Mr. [REDACTED] observed that Mr. [REDACTED] attempted to swim back to the raft on his stomach but was not able to so.¹⁸

Raft Drifts Free

Testimony indicates a person inside the raft cut the sea painter, allowing the raft to float away along the port side of the FPV GALAXY. Several witnesses testified that they saw one of three people ([REDACTED], [REDACTED], or [REDACTED]) cut the sea painter. According to the testimony, only Mr. [REDACTED] and Mr. [REDACTED] ever stated that they had a knife throughout the incident. However, all the named individuals testified that they did not cut the sea painter. Mr. [REDACTED] who was the last person to jump before Mr. [REDACTED] stated that he saw the painter being cut by Mr. [REDACTED] and that is why he jumped when he did.

¹⁶ This is the proper way to abandon ship in a survival suit.

¹⁷ Mr. [REDACTED] noted that he saw Mr. [REDACTED] “white head,” indicating the survival suit may have not been fully donned.

¹⁸ This is not the proper way to swim in a survival suit. The recommended practice is to swim on one’s back.

Mr. [REDACTED] who was standing next to Mr. [REDACTED] and Mr. [REDACTED] indicated that he did not see the line being cut, but noticed that “this line was all of a sudden gone” and that the raft then began to drift to the port side of the vessel.

According to the testimony of those remaining on the top deck, the raft drifted free from the FPV GALAXY at the same time or very quickly after Mr. [REDACTED] ill-fated jump for the raft. Most of the crew members in the raft stated they were not aware that the raft was free from the vessel. Mr. [REDACTED] testified that he was not initially aware that the sea painter had been cut loose. He further testified that he initially thought the sea painter had actually burned or chafed through and that was what had caused the raft to drift away.¹⁹

At the time the sea painter was cut, there were still five people on the top deck: Mr. [REDACTED] Ms. [REDACTED] Mr. [REDACTED] Mr. [REDACTED] and Mr. [REDACTED]. Mr. [REDACTED] and several other crew members who ended up jumping into the raft testified that while the people in the raft wanted everyone to jump and waited for what seemed to be a very long time, the crew that remained on the top deck showed no intention of jumping into the raft. [REDACTED] testified that he didn’t jump because he didn’t think he could make it into the raft. [REDACTED] and [REDACTED] stayed behind hoping to provide assistance to their cousin and uncle respectively, [REDACTED].

Ms. [REDACTED] initially prepared herself to jump and then hesitated because she did not want to leave Mr. [REDACTED] alone. After seeing Mr. [REDACTED] miss the raft and float away, she decided to remain on board the vessel. After the raft was cut loose, she, along with the remaining crew members on the top deck, attempted to pull Mr. [REDACTED] up the side of the ship. They were unsuccessful in their attempt. As she waited on the top deck with the others, the fire began to get closer and hotter and the flames were shooting through the steel deck. For Ms. [REDACTED] and Mr. [REDACTED] the encroaching fire and fear of additional explosions was an overwhelming motivation to jump from the ship. Ms. [REDACTED] testified that she ultimately jumped because,

“the fire was really, really hot and I could barely breathe anymore from all the smoke. And I was – like it got so close I was just worried if the wind direction changed or that I could possibly burn alive...so I decided that I would take my chances in the water...”

Ms. [REDACTED] asked the four remaining crew on the top deck if they wanted to jump with her, reasoning that five people in the water would make a larger target for any potential rescuers. Of the remaining four, only Mr. [REDACTED] who was still recovering from being thrown from the vessel as a result of the initial explosion and being knocked unconscious, was willing to jump into the water. After a brief discussion on deck with Mr. [REDACTED] to coordinate their jump, Ms. [REDACTED] jumped into the water wearing pajamas, a rain jacket, and holding onto a LD-3 buoy. Mr. [REDACTED] jumped in seconds later wearing a survival suit. Just prior to jumping, Mr. Newhall grabbed a life ring. By the time Mr. [REDACTED] had jumped, Ms. [REDACTED] had already started to drift to the starboard side of the vessel.

¹⁹ It was not until he arrived in St. Paul that he saw that the painter had been cut.

The two initially swam back to the port side of the vessel to see if the liferaft was still in the vicinity of the stern of the FPV GALAXY. It was not. The two then swam to the starboard side of the vessel and sighted the liferaft in the distance just clearing the bow of the ship, approximately 180-220 feet away. They then decided to swim for the liferaft with Mr. [REDACTED] taking the lead. The two were sighted by the crew members remaining on the bow of the FPV GALAXY. Mr. [REDACTED] swam a very short distance and found that Ms. [REDACTED] could not keep up. He turned around and yelled at her, insisting that "You have to swim! We're going to die if we don't make it to the raft!" They tried swimming again, this time with Ms. [REDACTED] inside of the ring buoy and Mr. [REDACTED] swimming and pulling her along. While they did manage to swim forward approximately 100 feet, the greater sail area of the vessel and the raft resulted in the vessel and the raft being blown by the wind faster than the two people in the water. As a result, the two in the water were left behind, drifting in the waves without any chance of making it to the raft or back to the FPV GALAXY.

After a period of time, Mr. [REDACTED] was able to activate the light on his survival suit and hold it in his hand above his head. The light was not a flashing strobe, but a steady beam that was activated by twisting the top. According to the testimony provided by Mr. [REDACTED] he was not able to activate the light on his own, and attempted to have Ms. [REDACTED] twist the top while he held onto the base. This did not work either, so he ended up turning it on by holding the top in his mouth and twisting the base with his hand. Mr. [REDACTED] kept Ms. [REDACTED] afloat by keeping her head out of the water and keeping her upper body in the ring buoy. He continually talked to her and kept her focused on staying awake. Even when she drifted in and out of consciousness, he kept her afloat. The two remained drifting in the water for approximately 1.5 – 2.0 hours.

Staying with the Ship (Stern)

Minutes after Ms. [REDACTED] and Mr. [REDACTED] jumped into the water, the three remaining crew members on the aft top deck ([REDACTED], [REDACTED] and [REDACTED]) again attempted to pull Mr. [REDACTED] up the side of the ship without success. The intensity of the smoke and fire was increasing and was getting closer to the aft rail where they were all standing. The heat of the fire was beginning to burn the back of their legs as they were attempting to pull Mr. [REDACTED] up the side of the ship. Unable to tolerate the heat any longer, and fearing for their lives, the three climbed up the aft mast on the ship, which was located on the aft most portion of the top deck. The three climbed the ladder as high as they could go and then waited for help.

About five minutes after Mr. [REDACTED] jumped, the line that Mr. [REDACTED] was attached to burned or chaffed through, causing Mr. [REDACTED] to fall into the water. Mr. [REDACTED] then drifted in the same general direction as Ms. [REDACTED] and Mr. [REDACTED]. Mr. [REDACTED] called out to the remaining crew members on the stern and Mr. [REDACTED] shouted at him "to stay calm, that the boat was on its way." Mr. [REDACTED] was also sighted by the crew members remaining on bow of the FPV GALAXY. The crew members on the forward main deck testified that he drifted along the same general track as Ms. [REDACTED] and Mr. [REDACTED]. Approximately 15 minutes after Mr. [REDACTED] went into the water, the crew members on the aft

mast sighted the lights of a fishing vessel. The lights turned out to be the F/V BLUE PACIFIC. The crew members continued to wait and then spotted another set of lights approximately 10 minutes later. The second vessel sighted was the F/V GLACIER BAY. The three waited on the aft mast for approximately 1 to 1.5 hour(s). The aft mast is depicted below in Figure (19)



Figure (19): Photo of the Top Deck Aft Mast taken in December 2001

Staying with the Ship (Forward Main Deck)

The raft, being affected more by the wind than the current, was blown to the port side of the FPV GALAXY and was subsequently pinned against the burning hot hull as the vessel set down on the raft. The raft immediately filled with choking black smoke and was threatened with sparks and flames as it passed the port side mooring station hatch, which was open and allowing the raging fire inside to escape to the exterior of the vessel. For a few minutes, the overwhelming smoke and heat forced the occupants to paddle for their lives, and forced them to place buoys between the raft and the FPV GALAXY to keep the raft away from the burning hot hull. Numerous crew members testified that they thought they were going to die during the time the raft was up against the FPV GALAXY. As the raft bounced along the port side hull and drifted towards the bow, the smoke began to clear and the heat dissipated.

As the raft passed the bow of the vessel, Mr. [REDACTED] had stuck his head outside the raft and saw the four crew members (Captain [REDACTED] Mr. [REDACTED] Mr. [REDACTED] and Mr. [REDACTED] on the bow. Mr. [REDACTED] shouted at them, telling them to jump. Mr. [REDACTED] did not hesitate and immediately jumped onto the quickly passing raft. He bounced off the side of the raft and landed in the water. However, the crew in the raft was able to recover him by holding out one of the broken raft paddles that came with the raft. He was then safely recovered. The remaining three did not react quickly enough to jump and within seconds the raft was out of reach.

Captain [REDACTED] testified that as the raft passed he shouted to Mr. [REDACTED] asking him if everyone had been rescued from the stern. He testified that he shouted "Did you get everybody? Is Red in the raft? Did you get everybody in the raft?" He testified that Mr. [REDACTED] responded in the affirmative. Mr. [REDACTED] testified seeing the four crew members on the bow as the raft drifted past, but does not recall what was said between the two men. Other crew members in the raft could not testify what was said between the two men.

Captain [REDACTED] testified that after the raft passed he believed everyone had been recovered from the stern. He stated he was very confused and frustrated when just a few minutes later he saw the first of four people drift past the bow. The first person was in a survival suit, followed by a person in the water clipped to some buoys, followed by another two people, one in a survival suit and one without. Captain [REDACTED] and Mr. [REDACTED] yelled, shouted and whistled to the raft, which at this point was approximately 50 yards away and drifting away from the FPV GALAXY at a high rate of speed.

Captain [REDACTED] testified that he saw Mr. [REDACTED] emerge from the raft briefly. Captain [REDACTED] attempted to communicate to him that there were people in the water in the hopes the raft could pick them up. Mr. [REDACTED] did not respond and went back inside the raft, zipping it shut. Captain [REDACTED] Mr. [REDACTED] and Mr. [REDACTED] waited on the bow for 1.5 – 2 hours before being recovered by the U.S. Coast Guard.

Inside the Raft

Once clear of the ship, Mr. [REDACTED] still recognized that the crew was far from safe and told them that they had to work together to survive. He kept up the crew's morale by leading them in prayer and telling them that they would be rescued in a few hours. Recognizing that of the 15 people in the raft, only six were wearing survival suits, he took the two thermal protective aides (TPAs) from the equipment pack inside the raft and put them on the two coldest members. He then arranged the crew so that the people with survival suits were sitting on the bottom and those without were sitting on top. This was done to keep the non-suited people out of the freezing cold water. He continued to protect the crew by removing the bladders off the survival suits and turning them into hats and gloves for the non-suited people. He fully utilized the contents of the equipment pack, using the tablets to prevent sea sickness, bailing buckets, food and water. He also used the fishing kit to close a four foot rip in the raft canopy that had been caused by the crew jumping into the raft.

The crew at this point was exhausted, wet, and several people were hurt as a result of jumping into the raft. Several had been injured by falling on top of other people or landing on the buoys still inside the raft. As they drifted, Mr. [REDACTED] stated that he thought he heard the sound of a helicopter. He looked outside the raft but found the noise to be coming from a strap of the raft beating on the top of the canopy. At that time he saw Mr. [REDACTED] again. Mr. [REDACTED] was several hundred yards away from the raft floating in the survival floating position (face up). The raft drifted approximately 1.5 – 2 hours before being recovered by the FPV GLACIER BAY.

c. RESCUE AND RECOVERY

The response to the FPV GALAXY began immediately upon LORSTA St. Paul and the F/V CLIPPER EXPRESS receiving the initial MAYDAY broadcast. Five primary rescue platforms initially assisted in the search, rescue and recovery of the crew members from the FPV GALAXY.²⁰ Table (14) is a summary of these actions.

1635	MAYDAY broadcast from FPV GALAXY and received by USCG LORSTA St. Paul & F/V CLIPPER EXPRESS in St. Paul Harbor.
1636	LORSTA St. Paul notifies RCC Juneau, AK
1637	USCG AIRSTA Kodiak directed to launch CG1707 C130 fixed wing aircraft
1644	USCG COMMSTA Kodiak directed to broadcast UMIB over VHF Channel 16.
1645	F/V BLUE PACIFIC responds to COMMSTA Kodiak. Vessel will respond and is in position 56-28 N, 170-23 W, approximately 23 nm away.
1646	RCC directs helicopter CG6021 in Cold Bay to launch.
1648	F/V HORIZON responds to COMMSTA Kodiak. HORIZON is responding and is in position 56-45N, 171-00W.
1650	RCC Juneau directs USCGC JARVIS to divert at fastest possible speed to estimated position of F/V GALAXY. CGC JARVIS is approx 260 NM away.
1657	RCC Juneau notifies St. Paul Fire to be prepared for possible injured personnel.
1658	F/V CLIPPER EXPRESS is responding. Vessel is approximately 30 NM away.
1658	F/V GLACIER BAY responds to COMMSTA Kodiak. GLACIER BAY responding and is in position 56-42N, 170-14W, approx 30 NM away.
1705	CG6021 launches from Cold Bay, AK.
1728	CG1707 launches from Kodiak, AK.
1755	CG6012 launches from Kodiak, AK.
1910	CG6021 on scene with FPV GALAXY.
1918	F/V BLUE PACIFIC reports to COMMSTA Kodiak visual sighting of vessel. 4 people located on bow, 3 people on stern.
1920	CG6021 initiating hoisting of 3 from stern.
1934	CG1707 on scene.
1939	CG1707 deployed datum buoy in position 56-47 N, 170-53.9 W.
1941	F/V GLACIER BAY recovers liferaft w/15 POB.
1942	F/V BLUE PACIFIC reports 1 POB recovered on board.
1947	F/V CLIPPER EXPRESS reports recovering 2 people alive from water.
2004	F/V CLIPPER EXPRESS reports 1 person recovered from water w/out pulse.
2027	CG6021 reports 5 POB & is hoisting a crew member that CPR is being done on from the F/V CLIPPER EXPRESS.
2041	CG1707 finds debris field. Raft w/ strobes deployed in 56-43.3 N, 170-58.6 W.
2058	CG6021 reports 6 POB & enroute to St. Paul.
2135	CG6021 on deck in St. Paul. Transferring patients to local EMS.

Table (14): Timeline Summary of Search and Rescue Efforts

²⁰ Three Good Samaritan vessels, the F/V BLUE PACIFIC, the F/V GLACIER BAY, and the F/V CLIPPER EXPRESS responded from the vicinity of St. Paul Island. In addition, the U.S. Coast Guard immediately launched a C130 fixed wing aircraft from Kodiak and a HH-60 helicopter from Cold Bay

1635: ETC [REDACTED], who was on watch at LORSTA St. Paul, received the initial MAYDAY call from Captain [REDACTED]. He recorded the time of the MAYDAY transmission as 1635. In addition to LORAN Station St. Paul receiving the MAYDAY broadcast, the F/V CLIPPER EXPRESS, which was taking on fuel in St. Paul, also heard the broadcast. The master of the F/V CLIPPER EXPRESS, Mr. [REDACTED], recorded in their ship's log that the time of the MAYDAY was 1636.

1636: ETC [REDACTED] gathered the critical information regarding the nature of the FPV GALAXY's distress and contacted the Coast Guard's Rescue Coordination Center (RCC) in Juneau, Alaska. This was the last radio contact with the FPV GALAXY.

1637: RCC Juneau directed USCG AIRSTA Kodiak to launch CG1707 C130 fixed wing aircraft from Kodiak, AK.

1644: RCC Juneau directed USCG COMMSTA Kodiak to broadcast a UMIB over VHF Channel 16. The wording of the UMIB read:

"F/V GALAXY, a 180 vessel has had an explosion on board. There are personnel in the water. The vessel is located 30 NM south / south-west of St. Paul Island. All vessels in the vicinity are requested to maintain a sharp lookout, assist if possible, and report all sighting to the United States Coast Guard."

1645: F/V BLUE PACIFIC responded to COMMSTA Kodiak's UMIB. The F/V BLUE PACIFIC indicated they were responding and their current position was 56-28 N, 170-23 W, approximately 23 NM away from the FPV GALAXY.

1646: RCC directed helicopter CG6021 in Cold Bay to launch. The flight crew for the CG6021 had completed a five-hour over flight of the red king crab savings area and had just refueled the aircraft and put it in its hanger. The crew was still in their flight gear when they received the notification to launch from D17 RCC.

1648: F/V HORIZON responded to COMMSTA Kodiak UMIB. The F/V HORIZON indicated they were responding and reported their current position as 56-45N, 171-00W.

1650: RCC Juneau directed USCGC JARVIS to divert at fastest possible speed to the estimated position of FPV GALAXY. CGC JARVIS proceeded on a course of 270 true at 12 knots. CGC JARVIS was approximately 260 NM away at the time of notification.

1657: RCC Juneau notified the St. Paul Fire and Police Department to be prepared for possible injured personnel from the FPV GALAXY.

1658: F/V GLACIER BAY responded to COMMSTA Kodiak's UMIB. The F/V GLACIER BAY indicated they were responding and reported their position as 56-42N, 170-14W, approximately 30 NM away.

1705: CG6021 launched from Cold Bay, AK. The four person crew was under the command of Lieutenant Commander [REDACTED].

1728: CG1707 launched from Kodiak, AK.

1750: F/V CLIPPER EXPRESS made a visual sighting of a smoke column and proceeded in that direction, towards the FPV GALAXY.

1752: CGC JARVIS received the position of F/V BLUE PACIFIC (56-50N, 170-50W). The F/V BLUE PACIFIC estimated that they would be on scene in approximately one hour.

1755: CCG6012 airborne from Kodiak, AK.

1850 (estimate): Approximately twenty minutes prior to arriving on scene, the CG6021 established communications with the F/V BLUE PACIFIC and the F/V GLACIER BAY. The F/V GLACIER BAY had already spotted the liferaft from the GALAXY and was proceeding towards the raft. As shown in Figure (20), the F/V BLUE PACIFIC (foreground) circled the vessel, looking for people in the water and attempting to locate and verify the number of people remaining on board.



Figure (20): Good Samaritan Vessels Providing Assistance to FPV GALAXY

1910: CG6021 on scene with FPV GALAXY.

1914: Ms. [REDACTED] and Mr. [REDACTED] sighted three vessels and a U.S. Coast Guard helicopter in the vicinity of the FPV GALAXY. Despite having an activated personal marker light (PML) and being in an international orange survival suit and having an international orange ring buoy, they were not initially sighted by the U.S. Coast Guard helicopter, the F/V BLUE PACIFIC or the F/V GLACIER BAY. Ms. [REDACTED] testified that the helicopter “pretty much (flew) right over the top of us.”

1915: When the CG6021 arrived on scene, the winds were out of the North – Northeast at 20 - 30 knots and seas coming out of the north-northeast at 15-20 feet. The FPV GALAXY was beam to the seas and was rolling 30 degrees port to starboard. The CG6021 conducted an over flight of the immediate vicinity of the FPV GALAXY and did not find evidence of people in the water. LCDR [REDACTED] stated that while visibility conditions on scene were generally good, the combined visual distractions of 20 foot waves, rolling seas, whitecaps and wind blowing streaks across the water made finding people in the water extremely difficult. LCDR [REDACTED] also stated that a steady beam PML, such as the one being held Mr. [REDACTED] is much more difficult to see than a PML with a strobe beacon. Having conducted a brief search of the area for people in the water, LCDR [REDACTED] determined that the greatest risk was to the six crew members remaining on the vessel. Due to the proximity of the fire to the three crew members remaining on the stern, the CG6021 moved into position to rescue those crew members first. CG6021 made a dry run to determine if the crew members on the aft top deck could be safely hoisted off the vessel. However due to an abundance of obstacles, entanglement hazards, potentially toxic smoke and explosions (most likely flares in the port side liferaft canister) present on the top deck, flight commander LCDR [REDACTED] made the determination to have the crew members jump into the water, where they could be safely recovered by a Coast Guard rescue swimmer.

1918: F/V BLUE PACIFIC reported to COMMSTA Kodiak four people located on bow and three people on stern.

1920: The CG6021 positioned itself off the aft starboard quarter of the FPV GALAXY. The rescue swimmer, AST3 [REDACTED], communicated with hand signals and gestures to the three men clinging to the aft mast and indicated for them to jump one at a time. After the rescue swimmer was lowered into the water, the first crew member, Mr. [REDACTED] jumped after climbing down the ladder and climbing over the rail. He was immediately recovered into a rescue basket and hoisted aboard the aircraft. The same procedure would be followed for Mr. [REDACTED] and Mr. [REDACTED] who were recovered without incident.

1930: F/V CLIPPER EXPRESS arrived on scene. The master coordinated with the other two Good Samaritan vessels and began a visual search in a location between the FPV GALAXY and the liferaft, reasoning that any people in the water would drift slower than the raft and could be found in that general location. Mr. [REDACTED] had placed two crewmembers ([REDACTED] and [REDACTED]) on the bow (wheelhouse) to search for survivors.

1934: CG1707 arrives on scene.

1939: CG1707 deploys a datum buoy in position 56-47 N, 170-53.9 W.

1940 (estimate): The lookouts on board the F/V CLIPPER EXPRESS spotted Mr. [REDACTED] Mr. [REDACTED] and Ms. [REDACTED] almost simultaneously. The F/V CLIPPER EXPRESS initially went past Mr. [REDACTED] who was tied to some buoys but was fully submerged in the water. The vessel proceeded directly to Mr. [REDACTED] and Ms. [REDACTED] who were clearly alive and waving.

1941: The FPV GLACIER BAY maneuvered alongside the raft and was able to pass a line to the raft. The line was secured around the canopy support on the raft and then secured to the hauling station on the vessel. Mr. [REDACTED] testified that Mr. [REDACTED] instructed the crew that those without survival suits would get off first, and then the people with survival suits would get off last. The crew then climbed up a Jacob's ladder onto the FPV GLACIER BAY. The raft was brought aboard the vessel and then the vessel proceeded to St. Paul.

1942 (estimate): While the helicopter was conducting hoisting operations on the stern of the FPV GALAXY, the F/V BLUE PACIFIC was circling the FPV GALAXY in a clockwise rotation. As the F/V BLUE PACIFIC passed alongside the FPV GALAXY's port side bow, Captain [REDACTED] directed Mr. [REDACTED] who was wearing a survival suit, to jump from the bow into the water. Captain [REDACTED] assessed that the current and wave action would carry Mr. [REDACTED] directly in the path of the F/V BLUE PACIFIC. Captain [REDACTED] was not able to communicate his intentions to the F/V BLUE PACIFIC or the CG6021. Unedited video footage recorded by a crew member from the F/V BLUE PACIFIC shows Mr. [REDACTED] in the water immediately after he jumped and shows him swimming to and being recovered by the F/V BLUE PACIFIC. To recover Mr. [REDACTED] the crew members on board the F/V BLUE PACIFIC threw two life rings in the water. Mr. [REDACTED] was able to grab hold of both rings and was successfully hauled aboard. He was in the water approximately 4-5 minutes. Once on board, he was treated for hypothermia.

1943: Hoisting operations completed on the stern.

1945: Shortly after Mr. [REDACTED] was onboard the F/V BLUE PACIFIC, the helicopter, with the three crew members off the stern safely on board, hovered near the bow of the FPV GALAXY to recover the last two crew members on the FPV GALAXY, Mr. [REDACTED] and Captain [REDACTED]. As with the recovery effort on the stern, the flight crew determined that attempting an on-deck rescue posed too many risks to the flight crew and to the men on the forward main deck. As a result, the rescue swimmer again communicated with hand signals and gestures to the two men remaining on the bow and indicated for them to jump one at a time. Mr. [REDACTED] jumped first and was immediately recovered into the basket and hoisted aboard the helicopter. Captain [REDACTED] was the last person to abandon ship from the FPV GALAXY. He jumped into the water and was recovered without incident.

1945: Unedited video footage taken from the F/V BLUE PACIFIC clearly showed several watertight doors were left open to the seas during the abandonment of the vessel. The watertight doors and hatches left open and visible on the video footage are the starboard side gear hauling station, the aft gear setting station, and the port side mooring station. In addition, the numerous galley windows on the stern of the vessel appear to have been open to the seas, either as a result of the explosion or a result of the ensuing fire.

1947: The F/V CLIPPER EXPRESS recovered Ms. [REDACTED] and Mr. [REDACTED]. As they were being hauled aboard the vessel, Mr. [REDACTED] lost his grip on Ms. [REDACTED] and a crew member from the F/V CLIPPER EXPRESS jumped in the water to recover her. Once both were on board, Captain [REDACTED] had them both treated for hypothermia. Captain [REDACTED] assessed that Mr. [REDACTED] was in good shape. However, Ms. [REDACTED] was unconscious and very hypothermic. Ms. [REDACTED] who had been in the water for approximately 1-1.5 hours without a survival suit, was put into a stateroom bunk and the crew members from the F/V CLIPPER EXPRESS rotated in the bunk to re-warm her. The master also used hot packs to re-warm the groin and arm pit areas. She regained consciousness in approximately 1.5 hours.

2004: The F/V CLIPPER EXPRESS recovered Mr. [REDACTED] who had buoys tightly tied around his midsection. A rescue swimmer from the F/V CLIPPER EXPRESS was placed into the water to retrieve Mr. [REDACTED]. Because Mr. [REDACTED] had been submerged in the water for an unknown amount of time, a crane was used to hoist him aboard the vessel. When he was recovered on board, Captain [REDACTED] reported that he was foaming at the mouth. Mr. [REDACTED] was taken to a warm area on the ship, in the vicinity of the interior engine room stack, where two crewmembers, [REDACTED] and [REDACTED], immediately initiated CPR. Mr. [REDACTED] testified that at one point while CPR was being performed Mr. [REDACTED] temporarily regained a "real weak pulse."

2027: The CG6021 departed the FPV GALAXY enroute to St. Paul. Captain [REDACTED] was immediately treated for his injuries. As the helicopter was departing the F/V GALAXY, the F/V CLIPPER EXPRESS radioed the helicopter that they had recovered a person ([REDACTED]) out of the water who had no pulse and who was having CPR administered to him. The helicopter immediately diverted to the F/V CLIPPER EXPRESS.

2041: CG1707 sighted a debris field from the FPV GALAXY and deployed a lighted liferaft (with two strobes) in position 56-46.3 N, 170-58.6 W.

2044: CG6021 arrives on scene at F/V CLIPPER EXPRESS. A basket was lowered down to the deck of the F/V CLIPPER EXPRESS and Mr. [REDACTED] was placed inside.²¹

2058: [REDACTED] was hoisted on board and the flight crew initiated CPR on him and continued until CG6021 landed in St. Paul. During the flight, the rescue swimmer relayed to the aircraft commander that Mr. [REDACTED] briefly had a very weak pulse.

2135: CG6021 on deck at St. Paul and the crew members from the GALAXY were transferred over to local emergency personnel and were taken to the clinic in St. Paul.

2215: CG6012 departed from Cold Bay enroute to the scene of the accident.

0107: (October 21, 2002): CG6012 on scene and begins the first of numerous searches for [REDACTED] and [REDACTED].

²¹ Usually a stokes litter is used to recover a non-ambulatory person. However, due to the large number of survivors in the helicopter, the stokes litter was not accessible. As a result, the crew of the helicopter had to use the basket, instead of a stokes litter.

d. AFTERMATH

Search for the Crew: After the recovery of the crew members from the water and from the FPV GALAXY, the U.S. Coast Guard and the three Good Samaritan vessels, and the F/V HORIZON, also owned by Aleutian Spray Fisheries, continued to search for Mr. [REDACTED] and Mr. [REDACTED]. The U.S. Coast Guard RCC determined [REDACTED], a 43-year old male, weighing 180 pounds and wearing coveralls and heavy undergarments, would have a survival time of 18.2 hours following immersion into the water. For [REDACTED], a 44-year old male weighing approximately 175 pounds and wearing a survival suit, the survival time would be 25.8 hours. The searches conducted were sector, parallel, and creeping line searches and covered over 1900 square miles of the Bering Sea. Datum marker buoys were deployed to mark drift. Debris sightings consisting of a survival suit, floats, and other debris from the vessel were noted by the searching aircraft on the first and second day of the search.

Attempted Recovery of the FPV GALAXY: Following the initial SAR phase of the accident, U.S. Coast Guard Marine Safety Office Anchorage initiated efforts to track the drifting vessel due to the possibility of a large diesel spill if the vessel grounded. The principal platforms utilized to track the vessel were U.S. Coast Guard aircraft and the USCGC JARVIS. These assets tracked the vessel by conducting visual searches. The FPV GALAXY was last sighted by the U.S. Coast Guard in position 56-22 N, 171 -20 W at 1715 on October 21, 2002. The vessel was photographed at that time and is shown in Figure (21).



Figure (21): Last Known Photograph of FPV GALAXY taken October 21, 2002

On October 21, 2002 GALAXY LLC hired Magone Marine for the purpose of retrieving the FPV GALAXY and towing the vessel to Dutch Harbor. Magone Marine dispatched the M/V REDEEMER on October 21, 2002. Due to the extremely poor weather conditions at the time, the M/V REDEEMER was forced back into Dutch Harbor to await a better weather window.

Transport of Crew and Post Casualty Drug Testing: Two crew members, Mr. [REDACTED] and Mr. [REDACTED] needed medical attention beyond first aid were medivaced to Anchorage, AK from St. Paul Island. Captain [REDACTED] whose injuries were severe, was medivaced to the burn unit at Harborview Hospital in Seattle, WA. Mr. [REDACTED] and Ms. [REDACTED] were transported on the F/V CLIPPER EXPRESS to Dutch Harbor and then were flown to Seattle, WA. Post casualty drug and alcohol tests of all crew members were conducted immediately following the incident. There were no positive test results.²²

Formal Investigation Initiated: On October 21, 2002, the Commander of the Seventeenth Coast Guard District, Rear Admiral (RADM) James Underwood, ordered that a Formal Investigation be initiated to determine the cause of the explosion, fire and sinking of the FPV GALAXY. LCDR [REDACTED], Chief of the Port Operations department at Marine Safety Office Anchorage, was designated as the investigating officer for this incident. Initial interviews of all the surviving crew members were completed within a week of the initial casualty. Public hearings were conducted in Seattle, Washington from December 9-18, 2002 and January 21-24, 2003. Testimony from thirty-four witnesses, vendors, and technical experts was obtained during these hearings.

Man Overboard Incident on the F/V CLIPPER EXPRESS: After recovering Mr. [REDACTED] and Ms. [REDACTED] the F/V CLIPPER EXPRESS continued to assist in the search for Mr. [REDACTED] and Mr. [REDACTED]. On October 22, 2002, the F/V CLIPPER EXPRESS proceeded to Dutch Harbor with Mr. [REDACTED] and Ms. [REDACTED] on board. At 0945 during the trip to Dutch Harbor, a crew member from the F/V CLIPPER EXPRESS, Mr. [REDACTED], fell overboard while trying to secure a U.S. Coast Guard liferaft that had been used during the search for Mr. [REDACTED] and Mr. [REDACTED]. The U.S. Coast Guard diverted aircraft and the USCGC JARVIS from tracking the FPV GALAXY and immediately initiated a search for Mr. [REDACTED]. Mr. [REDACTED] was never located. He is missing and presumed dead. The scope of this investigation does not address this man overboard incident. The U.S. Coast Guard case for this man overboard incident is MISLE Activity number 1696212.

EPIRB Hit from FPV GALAXY: At 1119 on October 22, 2002, an unlocated EPIRB hit registered to the FPV GALAXY was transmitted to the RCC in Juneau.²³ The EPIRB registered to the FPV GALAXY was an Alden Satfind M3. This model can either be activated manually or automatically when it is immersed in salt water. The photograph taken on October 21, 2002 provides numerous clues as to why the EPIRB activated. The photograph clearly shows the vessel's gear hauling hatch and gear setting hatch were wide

²² Captain [REDACTED] post casualty drug test occurred following admittance into Harborview Medical Center in Seattle, WA. He was tested following the administration of prescription narcotics by his physician. As expected, Captain [REDACTED] drug test results indicated the presence of opiates.

²³ An unlocated hit is when the EPIRB until does not transmit long enough to verify the location of the EPIRB.

open to the seas. Because the poor weather conditions which occurred on October 22, 2002, and due to the exterior watertight hatches being open to the seas, Captain [REDACTED] testified that he believed the vessel would have quickly sank.

Search is Suspended: After searching a 1900 square mile area and dedicating 69 hours of flight time, RADM Underwood suspended the search for [REDACTED] and [REDACTED] at 1900 on October 23, 2002.

Discovery of a Survival Suit and Human Remains on Tanaga Island: On June 9, 2003, a human jaw bone was discovered by Mr. [REDACTED] with the U.S. Fish and Wildlife Service in location 51-50.07 N, 177-42.66 W on the northern shore of Tanaga Island, in the central Aleutian Chain. The jawbone was discovered above the high tide line. On June 12, 2003, an Imperial survival suit, serial number #70009, was discovered by Mr. [REDACTED] above the high tide line in location 51-49.66 N, 177 43.93 W, a quarter mile away from where the jawbone had been discovered three days earlier. The survival suit had a large hole in the back and along the right leg. The back of the suit had been marked and read "M/V GA..." and there was a servicing date and serial number on the suit. No additional remains were found in the suit.

The jaw bone and the suit were taken into custody by the Alaska State Troopers on June 16, 2003. The suit and the jawbone were photographed and examined. Investigation by the Alaska State Troopers determined that the suit had last been inspected by Imperial Manufacturing Company in Seattle, WA on August 15, 2000. According to records at Imperial, the survival suit belonged to the FPV GALAXY. The jaw bone was compared to dental records of Mr. [REDACTED], which had been provided by Mr. [REDACTED] next of kin, [REDACTED]. Mr. [REDACTED] had last been seen on October 20, 2002 in a survival suit approximately 30-35 miles southwest of St. Paul Island. Forensic analysis by the State of Alaska Medical Examiner's Office determined that the jaw bone remains were that of Mr. [REDACTED]. Mr. [REDACTED] remains were found approximately 450 miles away from where he was last seen alive.

12. Casualty Analysis

In complex marine accidents such as the incident on board the FPV GALAXY, there is rarely one key action or single event that causes the accident. According to Reason (1997), in most complex industrial type accidents, there are a series of failures within the given safety regime which, given the right circumstances, allow a rather minor initiating event to propagate into a much more serious accident. Reason's accident prevention model is based on the concept that various layers of defenses can be erected or put in place to prevent losses or accidents from occurring (Reason 1997). Ideally, each of these defensive layers is always intact and as a result an initiating event that possibly could lead to an accident would never progress beyond the first layer of defense. In reality, each defensive layer has holes within it and these holes are growing or shrinking and are in a constant state of flux. These varying states of defensive protection can be influenced by active failures as well as latent conditions, both of which contribute to accidents. Active failures are specific acts, usually errors or violations of operating standards committed by participants controlling key operations within the safety system. Latent conditions include conditions that may be present for long periods of time, even years, before they combine with existing conditions and active failures to penetrate the safety systems' many layers of defenses and cause an accident to occur (Reason 1997). While Reason developed the descriptions of the defensive layers for technically intensive, large-scale industrial applications, they are still useful to evaluating the fire and explosion on the FPV GALAXY.

Using the previously established findings of fact in sections 1-11, it is the intent in this section to conduct a casualty analysis to achieve two results: determine to the maximum extent possible the initiating event and then to identify the failures in the existing safety regime that most fully explains how and why the accident on the FPV GALAXY occurred.²⁴ This section will analyze the following issues:

Analysis of Initiating Event

- Location of the Initial Smoke and Fire
- Type of Explosion
- Cause of the Initial Smoke and Fire Leading to the Explosion

Analysis of the Existing Safety Regime

- Assessment of the Manning and Watch Standing Practices
- Assessment of Vessel's Fire Prevention, Detection, and Suppression Systems
- Assessment of Life Saving Equipment and Arrangements
- Assessment of On Board Safety Training and Drills
- Assessment of Crew Response (Fire Team, Man Overboard, and Abandon Ship)
- Assessment of the Coast Guard's Search and Rescue Response

²⁴ The assessment of the safety regime will generally focus on the regime in place for catcher-processor and fish processing vessels that operate in the BSAI/GOA fisheries.

a. Analysis of the Initiating Event: The most problematic question in this analysis is identifying the initial source of the smoke and fire that eventually led to the explosion. Without physical evidence to examine or real time data recording the performance of individual pieces of equipment and systems operating in the engine room, the ability to determine what triggered the development and ignition of explosive gases cannot conclusively be identified. As such, this section of analysis heavily relies upon comparing the existing body of literature on vessel fires and explosions with the statements of the crew. In addition to this analysis, the Investigating Officer for this incident sought the assistance of Dr. [REDACTED] of Burgoyne Incorporated to help in determining the amount of fuel needed to cause an explosion of the magnitude experienced on the FPV GALAXY and to speculate on possible causes of the fire and explosion. The summary of his findings is available from Marine Safety Office Anchorage. Due the limitations already stated, the analysis conducted by Dr. [REDACTED] for the initiating event is highly speculative.

The following section discusses the location of the fire, the likely type of explosion that occurred, and reviews several possible scenarios that could have caused the initial fire and generation of explosive gases.

Location of Initial Smoke and Fire:

Mr. [REDACTED] testified that he saw large amounts of smoke in the lower engine room approximately three minutes prior to the explosion. In addition, Mr. [REDACTED] and Mr. [REDACTED] each testified that they saw smoke and flames coming up from the lower engine room into the upper engine room prior to the explosion. Numerous members of the fire team testified that they witnessed smoke coming from the port and starboard upper engine room hatches.

Type of Explosion:

Due to the lack of physical evidence, it is necessary to categorize the explosion on board as described by the vessel's crew before attempting to describe the initial source of the fire. Based upon the existing literature and the testimony provided from crew members of the FPV GALAXY, testimony of expert witnesses, vendors, and other people associated with the vessel, the explosion type most consistent with the observations of the crew is that of a backdraft explosion. The following is a summary of a backdraft analysis as described by Zalosh (2002).

Fleishman et. al. (1996) define a backdraft as a rapid deflagration following the introduction of oxygen into a compartment filled with accumulated unburned fuel. The first step in the development of a backdraft is the formation of a fuel-rich atmosphere in an oxygen vitiated enclosure. The second step is the sudden introduction of air into the enclosure by opening a door or window. As air flows into the enclosure and the hot fuel rich gases are flowing out, a mixing region develops at the boundary between the two streams. If the mixture becomes large before it encounters a sufficiently hot surface to ignite it, then a deflagration occurs. The

expanding flame front generated in the deflagration pushes fuel rich gases out through the enclosure opening followed by a fire ball or flame jet. Finally, a blast wave propagates away from the enclosure at a speed somewhat greater than the speed of sound.

In comparing the descriptions of the crew members on board to field observations noted in existing backdraft literature, in particular Zalosh (2002) and Gottuk et. al. (1999), the descriptions of the explosion experienced on the FPV GALAXY are remarkably consistent with known backdraft explosions. The necessary physical parameters, the behavior of the smoke, the timing of the explosion following the opening of the two hatches, and the force of the blast are consistent with this analysis.

Physical Parameters and Availability of Fuel: Certain quantitative conditions have to be met to create a backdraft explosion. First, the fuel mass fraction concentrations must be 16% at the time of air inflow. Second, oxygen concentrations must be below 12%, and finally the local gas or wall temperatures must be above the auto ignition temperature for the fuel vapor. Such calculations can only be obtained through complex fire modeling. However, due to a lack of physical evidence, such complex modeling was not possible. However, some limited calculations were performed to determine the amount of fuel needed to cause an explosion of the magnitude experienced on the FPV GALAXY. Based upon the volume of the FPV GALAXY's engine room and the amount of force necessary to knock three men overboard, Dr. [REDACTED] determined that a minimum of 32 gallons of atomized diesel fuel would be needed to create the explosion.

Smoke Color and Behavior: According to testimony provided by Mr. [REDACTED] the smoke was initially reported as being "thick black" and then transitioning to white, yellowish white" just seconds before the explosion occurred. These observations of changes in smoke color are very consistent with a backdraft explosion that occurred in Brooklyn, NY in June 2001 as documented by Zalosh (2002). According to the testimony of Mr. [REDACTED] the smoke was not entering into the refrigeration space when he stood at the threshold of the watertight doorway between the refrigeration space and the engine room. This is likely to have been caused by a pressure differential between the two spaces, which is common in the development of a backdraft explosion and also indicates that the air was flowing towards the engine room.

"Breathing" Prior to Explosion: Immediately prior to the explosion on board the FPV GALAXY, Mr. [REDACTED] who was located on the forward main deck holding open the port side door into the accommodation spaces witnessed the following:

"It was just a massive, almost like an implosion, because it was like it took a big breath before it blew."

This observation of air being drawn into the vessel is again is remarkably consistent with the backdraft explosion documented in Zalosh (2002) where several witnesses reported "a loud sucking noise right before the explosion," indicating air rushing into the building just prior to the explosion.

Introduction of Air into the Engine Room and the Timing of Explosion: According to the literature available, backdraft explosions typically occur following the introduction of air into an oxygen vitiated enclosure. The engine room was not completely closed off, which could allow air to flow into that space. The watertight hatch leading into the lower engine room was left open. The dampers leading to the forward main deck were not manually closed. The starboard hatch to the upper engine room was only partially closed (one dog secured).²⁵ In addition to these closures not being secured, various crew members opened hatches leading outside to the main deck, and also opened hatches allowing air to flow in from the gear setting and hauling stations. Opening any of these hatches or doors could potentially provide sufficient air flow into the engine room which in turn could cause an explosion to occur. Another potential source of air may have been the air receiver located in the engine room. It is possible that the “click” heard by the fire team may have been the safety relief valve on the air receiver lifting. If the safety relief valve had lifted, the receiver would have discharged air directly into the engine room and possibly could have provided the air necessary for the explosion to occur.

Once a sufficient amount of air is introduced, an explosion occurs fairly quickly. According to experiments conducted by the U.S. Navy, backdraft explosions typically occur 15-23 seconds following the introduction of air into the space (Gottuk et al., 1999). According to the testimony of the crew members on the FPV GALAXY, the explosion occurred approximately 30 - 45 seconds following the opening of two hatches: one into the gear hauling station and one to the gear setting station.

Force of the Explosion: According to the testimony provided, the force of the explosion was sufficient to simultaneously eject three people out of the gear setting hatch as well as knock down one person standing in the vicinity of the port side hatch leading out onto the forward main deck. Based upon Gottuk et. al (1999) “the forces of the gases rushing through the buffer zone doors was estimated by the safety team personnel to be sufficient to knock over a man.” According to the testimony of fire fighters in the Astoria Hardware Store blast, several men reported being blown off their feet and landing up to ten feet away (Zalosh 2002). Typical explosion overpressures associated with knocking people over are of the order of one to two pounds per square inch.

A backdraft explosion has sufficient power to cause physical damage as well. The Astoria Hardware Store blast was of sufficient strength to “blow out the brick sidewall of the basement, and lift(ed) the basement ceiling (Zalosh 2002).” Although not confirmed in testimony, it is likely that the force of the blast was also strong enough to blow open the watertight hatch leading to the mooring station on the port side of the vessel.

Observation of a Fireball: The final observation consistent with a backdraft explosion is the presence of a fireball following the explosion. As previously described, a characteristic fireball is often present in a backdraft explosion. Not all crewmembers on the FPV

²⁵ Based upon the observations of several crew members who stated that smoke was pouring from the upper engine room hatches, it is apparent that the doors were not fully secured.

GALAXY witnessed a fireball, however, Mr. [REDACTED] reported seeing a fireball move past the CO2 room door entry (forward to aft) immediately during or following the explosion.

Cause of Initial Smoke and Fire Leading to the Explosion:

This section briefly evaluates six scenarios that could have possibly led to the initial release of fuel which may have in turn caused the explosion. There were several potential sources of smoke and fire in the engine room: two 874-gallon fuel day tanks, a fuel centrifuge which was piped to a settling tank with 3,000 gallons of fuel in it, and various high and low pressure fuel lines on the main diesel engines and the starboard generator. All of this equipment was operating during the time leading up to the casualty. A failure of any of this equipment could have allowed fuel to leak into the engine room. The following is a list of six scenarios that may have initiated the chain of events leading to the fire in the engine room. Each scenario considers the following four questions: was there enough fuel available to meet Dr. Atherton's criteria of 32 gallons; would the fuel be released under pressure; was there a likely ignition source available; and is the scenario consistent with the observations of the crew? Each scenario is ranked as follows: Not Likely, Possible, and Likely.

Scenario One – Leak from Day Tanks: The day tanks were constructed using welded steel. The sight glasses on the tanks were Pyrex glass. The sight glasses were equipped with spring loaded check valves designed to stop the flow of the fuel should the sight glass fail. In addition, the sight glasses were protected by steel angle iron on both sides of the sight glass. There were no alarms or gauges installed on the day tanks to alert the crew of a leak from the day tank. If the sight glass was broken and the stop valve failed, or if there was a fracture or hole in the day tank, it is possible that liquid fuel could have leaked from the day tank in a liquid state. It was determined that a leak from a sheared off fitting for the sight glass could allow fuel to escape at a rate of 4 – 16 gallons per minute depending on the size of the hole left in the fuel tank. Liquid diesel fuel is difficult to ignite because it possesses a high ignition temperature. Thus, any possible fuel leak coming from the day tanks would have to come into contact with a sufficiently hot surface to atomize and ignite the fuel. The distance to the nearest heated surface, the MDEs, was approximately 6-8 feet away. Given the engine room's arrangement, the fuel most likely would have drained into the bilge instead of igniting on the MDEs. Also problematic with this scenario is that it does not explain the loss of electrical power in the minutes prior to the explosion. Based upon this analysis, a leak from either day tank could have provided the amount of fuel necessary to cause the explosion. However, given the levels of protection afforded to the sight glasses, the unlikelihood that the fuel would have been released under sufficient pressure to atomize the fuel, the lack of sufficient heat sources between the day tanks and the vessel's bilge, and the lack of consistency with the observations of the crew, this scenario is considered to be a "possible" source of the initial smoke and fire.

Scenario Two – Malfunction of the Fuel Centrifuge: The vessel's fuel centrifuge was on the forward port side of the lower engine room. The fuel centrifuge was gravity fed from a 6,000 gallon settling tank. The tank had approximately 3,000 gallons of fuel in it at the time of the accident. If there was a malfunction of the centrifuge, the fuel could have flowed from

the settling tank and out of the centrifuge at a maximum rate of seven gallons per minute. There were no alarms installed on the centrifuge to indicate a malfunction. According to testimony of Mr. [REDACTED] and Mr. [REDACTED], if the centrifuge failed or lost power, the centrifuge would (over a period of 15 - 20 minutes) begin to discharge liquid fuel into the bilge. The fuel would not come out of the centrifuge under the pressure necessary to atomize the fuel. Thus, fuel originating from the centrifuge would have to come into contact with a sufficiently hot surface to ignite the fuel. At the rate of seven gallons a minute, a malfunctioning centrifuge could have provided the amount of fuel necessary to cause an explosion. However, given that the fuel would not be under pressure, it would have to come in contact with a heat source. Given that the fuel would most likely drain into the bilge and the lack of sufficient heat sources between the centrifuge and the vessel's bilge, this scenario is "not likely" to be the cause of the initial smoke and fire.

Scenario Three – Failure of Various Fuel Lines on the MDEs: The MDEs were equipped with fuel pumps and supply / return lines which carried diesel fuel under pressure. If there was a failure of one or more of these lines, diesel fuel could have been discharged under pressure into the engine room. A leak from these lines could have lead to the discharge of highly volatile atomized diesel fuel into the atmosphere of the engine room. The amount of fuel going through certain hoses and lines (such as the high pressure fuel injection lines) would not have been able to provide enough atomized fuel to cause the explosion. However, the amount of fuel passing through the fuel supply or return lines would have been sufficient to supply enough fuel in an atomized state to cause the explosion.

Such spray fires are common in the marine industry (USCG 1998). According to the results of this study, the most common source of spray fires are "the skid piping, tubing, or hose(s) for diesel engines, turbochargers, and boilers." More recently, a July 2003 product warning from the U.S. Coast Guard indicates there has been a high rate of failure on pressurized fuel lines for Caterpillar D398s installed aboard U.S. Coast Guard cutters.

If the fuel had been discharged in an atomized state, it would circulate in the air like a mist, spreading throughout the engine room. In this atomized state, there would be a much higher probability of the fuel coming into contact with a surface hot enough to ignite the fuel. The exhaust manifolds, exhaust piping, and turbocharger surfaces are all readily hot enough to ignite atomized diesel fuel. Although the exhaust piping and manifolds were lagged, it is still possible that even a small exposed surface could have been a sufficient ignition source. It is also possible if the diesel fuel were to have sprayed onto the lagging, it could have saturated the lagging. In addition, a fuel leak from a high pressure line would not necessarily activate the heat detectors in the engine room until the fuel ignited on a hot surface. Under any scenario where a fuel line under pressure may have developed a leak, there would not be an engine alarm because there were no alarms on the fuel supply or return lines of the MDEs. In general, there would not be an alteration in the MDEs performance that would indicate a problem to the master or Chief Engineer. However, if the fuel supply line was affected on an MDE, the engine possibly could have stopped running. There was not a loss of performance noted on either MDE prior to the detection of smoke and fire.

Based upon the commonality of spray fires from diesel engines in the marine industry, the fact that either MDE could have provided enough atomized fuel to cause the explosion, and that the fuel supply and return lines are not equipped with alarms to warn of fuel loss, this is considered to be a “possible” scenario. However, considering that there was not a loss of performance noted in the engines, this scenario is not as likely as scenario four provided below.

Scenario Four – Failure of Various Fuel Lines on the Starboard Generator: The starboard generator was equipped with fuel pumps, supply / return lines, and high pressure fuel injection lines which carried diesel fuel under pressure. The operating pressures for the generator unit were much greater than the pressures for the MDEs. If there were a failure of on any of these lines, diesel fuel could have been discharged under pressure into the engine room. The amount of fuel going through the high pressure fuel injection lines would not have been sufficient to provide enough atomized fuel to cause the explosion. However, the amount of fuel passing through the fuel supply or return lines would have been sufficient to supply enough fuel in an atomized state to cause the explosion. Such spray fires are common in the marine industry (USCG 1998). According to the results of this study, the most common source of spray fires are “the skid piping, tubing, or hose(s) for diesel engines, turbochargers, and boilers.” More recently, a July 2003 product warning from the U.S. Coast Guard indicates there has been a high rate of failure on pressurized fuel lines for Caterpillar generators installed on board U.S. Coast Guard cutters.

If the fuel had been discharged in an atomized state, it would circulate in the air like a mist, spreading throughout the engine room. In this atomized state, there would be a much higher probability of the fuel coming into contact with a surface hot enough to ignite the fuel. The exhaust manifolds, exhaust piping and turbocharger surfaces are all readily hot enough to ignite atomized diesel fuel. These surfaces are the most common sources of ignition in engine room spray fires (USCG 1998). Because the exhaust piping and manifolds were lagged, it is possible that the atomized fuel could have spread throughout the engine room for a short period of time prior to igniting. This would be consistent with the observations of Mr. [REDACTED] who looked into the engine room and saw it filled with smoke, but did not note any flame or heat at the moment he was looking into the engine room.

Under any scenario where a fuel line under pressure may have developed a leak, there would not be an alarm, because there were no alarms on the fuel side of the prime mover to the generators. In general, a minor leak would not alter the starboard generator’s auxiliary engine’s performance to the extent which would indicate a problem to the master or Chief Engineer. However, if a larger leak developed on the fuel supply line to the generator’s prime mover, the prime mover may have shut down. This scenario is consistent with the vessel losing power approximately two minutes after the detection of smoke by the crew. It should be noted in Dr. [REDACTED] analysis that the shut down of the generator due to fire attack was not likely and that it is more likely that the generator tripped off line due to a loss of fuel (Atherton 2003).

Based upon the analysis that the generator could have provided enough atomized fuel to cause the explosion, and that the fuel supply and return lines were not equipped with alarms

to warn of fuel loss, this scenario is considered to be as likely scenario three. However, because vessel lost power just prior to the explosion, it is considered to be even more likely that the starboard generator (rather than the MDEs) was the equipment involved in the initial smoke and fire. As such, this scenario is considered to be “likely.”

Scenario Five - Shorting out of Starboard Generator: One theory, put forward by Mr. [REDACTED] was that the starboard generator shorted out to ground or something came loose inside the generator as a result of the large wave which impacted the vessel approximately one minute prior to the detection of smoke by the crew. Mr. [REDACTED] stated that if the generator shorted out, this would have produced a tremendous amount of heat and smoke instantly, which could have ignited a fuel oil or lube oil line. It seems likely that the heat produced by the short would have activated the heat detectors in the engine room, if the heat detectors were functioning properly. Under this scenario, the prime mover would continue to drive the generator, which in turn would continue to produce a tremendous amount of heat and smoke. Under this theory, as the lights flickered and drooped, the generator’s prime mover would begin to increase speed, trying to maintain the 60 hertz that the generator was set to. It was Mr. [REDACTED] theory that as the prime mover continued to speed up, it would overspeed, causing it to shut down. When the prime mover shut down, it would have produced a “click” sound. A “click sound” was reported by the fire crew 1-2 minutes prior to the explosion. Under this scenario, the heat from the generator shorting out would likely immediately ignite any diesel fuel and would have produced significant heat and flames. This is not consistent with Mr. [REDACTED] personal observation in the lower engine room, where he stated that he did not see any flames and did not feel any heat even though he was only 1 – 2 feet away from the starboard generator. As such, this scenario is “not likely” to be the initial source of smoke and fire.

Scenario Six – Winding Failure on the Starboard Generator: The final scenario considered is whether the windings failed on the starboard generator, thus creating sufficient smoke and unspent fuel to generate an explosion or a secondary fire. According to testimony provided, a similar accident occurred on board on or about August 23, 2002 involving the vessel’s port side generator. According to the testimony regarding that incident, the windings on the port side generator failed, initially causing the lights to flicker and droop, and then causing the ship’s power to fail. Mr. [REDACTED], the Chief Engineer at the time, was in the refrigeration space and was able to race forward and shut down the engine within 15 seconds. Mr. [REDACTED] stated when he arrived the engine room was thick with black sooty smoke and that the generator was arcing and sparking. Mr. [REDACTED] reported no secondary fires as a result of this arcing and sparking. There were no automated alarms reported activating during this event. This description of events is very similar to the testimony given by Mr. [REDACTED] as to what occurred on October 20, 2002. The notable exception is that Mr. [REDACTED] did not manually shut down the prime mover to the generator. As with scenario four, when the prime mover shut down, it would have produced a “click” sound. A “click sound” was reported by the fire crew 1-2 minutes prior to the explosion. It is not likely that the heat and smoke produced by the windings failing on the starboard generator would have produced sufficient fuel to create an explosion. Additionally, it is likely that the heat produced by the short would have activated the heat detectors in the engine room. It is “not likely” that this scenario was the source of the initial smoke and fire.

Other Scenarios Considered “Not Likely”: There have been several potential causes or initiating events that have been ruled out.

- Crankcase or Turbocharger Explosion as the Initiating Event: There has been speculation that either a crankcase explosion or a turbo-charger explosion was the initial event which led to the explosion. This scenario has been ruled out for the following reasons. Captain [REDACTED] testified that due to the sound enhancing properties of the fidley, the slightest of sounds occurring in the engine room could be clearly heard in the wheelhouse. During the time leading up to the initial smoke and explosion, the Captain was in the wheelhouse and did not report hearing anything unusual, except for a “woofing” sound which had already been linked to Mr. [REDACTED] opening the starboard side upper engine room hatch. Captain [REDACTED] did not testify to hearing an explosion prior to the large explosion that rocked the vessel.
- Crankcase or Turbocharger Explosion as the Explosion Event: While both crankcase and turbocharger explosions are significant events capable of inflicting serious damage to an engine room and adjacent personnel, it is extremely unlikely that this occurred on the FPV GALAXY. There is no precedent in the existing literature to suggest that either a crankcase or turbocharger explosion can produce a sufficient pressure wave to blast three men through a hatch located one deck up and approximately 40 feet away.
- Failure of Pressurized Lube Oil Line on the MDE or Starboard Generator: These scenarios have been ruled out because both the MDEs and the starboard generator were equipped with low lube oil pressure alarms. The master and the Chief Engineer both indicated that no alarms sounded prior to the incident. Also making this less likely is that fuel oil systems account for approximately 70% of all oil fires while lube oil systems account for about 30% (USCG 1998).
- Pressure Vessels as the Explosion Source: There were no propane, oxygen, or acetylene tanks stored in the engine or refrigeration rooms.
- Ammonia System as the Source of the Initial Explosion: Mr. [REDACTED] testified that he walked through the refrigeration space, not wearing an SCBA, three minutes prior to the explosion and noted that there was no smoke and no smell of anhydrous ammonia in that space. If there was an ongoing release of anhydrous ammonia in the refrigeration space, Mr. [REDACTED] would have noted the smell of ammonia, which produces an unmistakable and highly irritating smell.²⁶
- Hydraulic System as the Source of the Initial Fuel for the Explosion: The engine space has no hydraulic equipment installed (all the vessel’s hydraulic systems are located on the forward freezer deck and the steering space).

²⁶ Additionally, the ammonia system was seen venting as designed from its discharge location on the top deck mast during the abandonment of the vessel. If the system were compromised, it would not have vented.

b. Analysis of the Existing Safety Regime: The following sections address the key areas of vessel regulation and operation and compare the existing regulations to what is commonly seen and practiced within the BSAI/GOA head and gut fishing fleet. These comparisons are based upon local knowledge derived from Marine Safety Office Anchorage and from informal evaluations of approximately 11 head and gut fishing vessels conducted in Dutch Harbor, AK from January – April 2003.

Assessment of Manning and Watch Standing Practices:

Current Regulation for Licensing, Watch Standing and Manning: The U.S. Coast Guard has jurisdiction for licensing, watch keeping and manning standards. The following regulatory language, as described in Table (15) and Table (16) applies to licensing and watch divisions.

Position	Regulation	Specific Language
Captain	46 CFR 15.805 (a)	There must be an individual holding an appropriate license as master in command of each of the following vessels: (1) Every self-propelled, seagoing documented vessel of 200 gross tons and over.
Chief Mate	46 CFR 15.810 (c)	An individual in charge of the navigation or maneuvering of a self-propelled, uninspected, documented, seagoing vessel of 200 gross tons or over must hold an appropriate license authorizing service as mate.
Chief Engineer	46 CFR 15.820 (b)	An individual engaged or employed to perform the duties of chief engineer on a mechanically propelled, uninspected, seagoing, documented vessel of 200 gross tons or over must hold an appropriate license authorizing service as a chief engineer.
Assistant Engineer	46 CFR 15.825 (a)	An individual in charge of an engineering watch on a mechanically propelled, seagoing, documented vessel of 200 gross tons or over, other than an individual described in Sec.15.820, must hold an appropriate license authorizing service as an assistant engineer.

Table (15): Licensing Requirements for the Navigation and Engineering Departments

Watch Divisions	Regulation	Specific Language
Navigation & Engineering Watch	46 CFR 15.705 (e)(iii)	(e) Fish processing vessels are subject to various provisions of 46 U.S.C. 8104 concerning watches...(iii) If not more than 1600 gross tons-no watch division specified.

Table (16): Manning Requirements for the Navigation and Engineering Watches

Common Practice: While the licensing requirements for masters and mates is fairly straight forward, the enforcement of licensing requirements for engineering officers, especially assistant engineers, has been problematic on BSAI/GOA fishing industry vessels. Between the Officer in Charge of Marine Inspection Western Alaska (Seventeenth District) and Officer in Charge of Marine Inspection Puget Sound (Thirteenth District), there has not been consistent interpretation of whether an assistant engineer on fishing vessels 200 GT or greater are required to hold an appropriate license. The Thirteenth District Commercial Fishing Vessel Safety Program has generally required that assistant engineers on these vessels hold a license. However, the Seventeenth District's policy letter on this issue, dated October 11, 1995, is less definitive, stating only "If the engine room of your vessel is manned and there is an individual in charge of the engineering watch, a licensed engineer *may* be required." At the implementation level in the Seventeenth District, licenses for assistant engineers have not generally been required. Recent interviews with the U.S. Coast Guard Marine Safety Detachment in Unalaska indicate that their commercial fishing vessel examiners have not consistently been requiring licenses for assistant engineers. Furthermore, an informal survey of 11 head and gut vessels (each greater than 200 GT) in Dutch Harbor during January 2003 found that only two of the 11 had licensed assistant engineers.

This lack of consistent interpretation is in large part due to the wording of what constitutes an engineering "watch" as defined in 46 CFR 15.705. A "watch" is defined as follows:

The Coast Guard interprets the term watch to be the direct performance of vessel operations, whether deck or engine, where such operations would routinely be controlled and performed in a scheduled and fixed rotation. The performance of maintenance or work necessary to the vessel's safe operation on a daily basis does not in itself constitute the establishment of a watch.

The regulation goes on further to state that fish processing vessels less than 1600 GT are not required to maintain a watch. However, the regulation requiring an assistant engineer is based upon whether that person is in charge of an engineering watch. This confusion and seemingly contradictory language has resulted in inconsistent enforcement as to whether a licensed assistant engineer is required on board. As such, there are numerous fishing industry vessels 200 GT or greater operating in the BSAI/GOA that are operating without appropriately licensed engineers.

Discussion: Complicating the argument of whether an assistant engineer was required on the FPV GALAXY was a stipulation of the vessel's Certificate of Class. As part of the initial classification process, ABS and the vessel owner must consider the level of manning and automation in the engine room in order to classify the vessel's engine spaces appropriately. Specifically, the classification society and the owner must consider whether the vessel has a "manned space" or whether the vessel has a "periodically unattended engine space." A "manned space" is defined as follows:

Any space assigned at all times with crew members needed to locally supervise the operation of the specific machinery or system installed in the space.

It is the responsibility of the owner to indicate on the application to ABS what level of automation exists in the engine room. If there is no specific request from the owner to have the engine room meet the standards of a “periodically unattended engine space,” then the engine room is considered to be a “manned engine space.” According to the testimony provided by Mr. [REDACTED], the owners of the FPV GALAXY did not request nor submit appropriate paperwork to have the vessel classed with a “periodically unattended engine space.” Consequently, the FPV GALAXY was considered to have a “manned engine space” and was classed appropriately. As such, it seems evident that a watch would have been needed to meet the intent of the “manned engine space” standard. Based upon that supposition it appears a licensed assistant engineer would have been required. However, the ABS definition is not clear whether the engine room needs to have a person in the engine room 24 hours a day to meet this standard. Again, the definition of what constitutes a “watch” and what constitutes a “manned engine space” or “periodically unattended engine space” are not complementary and are not particularly descriptive. As such, it is not conclusive what watch keeping practices needed to be in place in the engine room on the FPV GALAXY to meet its classification standard.

Situation on the FPV GALAXY: Captain [REDACTED] and Mr. [REDACTED] were both properly licensed for their positions. Mr. [REDACTED] was not a U.S. citizen prior to the accident and has never possessed a U.S. Coast Guard license. Mr. [REDACTED] was properly licensed at the beginning of the voyage, however, his license expired on October 15, 2002. U.S. Coast Guard Regional Exam Centers (REC) in both Anchorage and Seattle were contacted to determine if Mr. [REDACTED] had initiated the renewal of his license. Neither REC had records indicating that Mr. [REDACTED] had initiated the renewal process.

Assessment of Structural Fire Protection Systems:

Current Regulation and Common Practice: There are no regulations regarding structural fire protection for existing commercial fishing vessels. There are however voluntary standards for structural fire protection which have been recommended by the U.S. Coast Guard.²⁷ For a very limited number of commercial fishing vessels²⁸ such as the FPV GALAXY, the U.S. Coast Guard has regulations in place for structural fire protection as provided in 46 CFR 28.380. These existing regulations are minimal in comparison to international standards under the treaty for the Safety of Life at Sea (SOLAS) and to other vessels inspected under 46 USC 3301. The total number of fish processing vessels and head and gut vessels whose structural fire protection measures meet or exceed the regulations provided in 46 CFR 28.380, NVIC 5-86 or SOLAS is unknown, but is thought to be extremely low.

Situation on the FPV GALAXY: The vessel was in compliance with structural fire protection rules required by the U.S. Coast Guard and ABS. However, based upon the description of

²⁷ In 1986 the Coast Guard published voluntary structural fire protection recommendations for commercial fishing vessel under Navigation and Vessel Inspection Circular (NVIC) 5-86.

²⁸ More precisely, commercial fishing vessels which have their keel laid or are at a similar stage of construction on or after or which undergo a major conversion completed on or after September 15, 1991, and that operate with more than 16 individuals on board.

the vessel given in Section Four, the FPV GALAXY had a significant fire load, especially along the gear line, the cargo holds and the accommodation spaces. This level of fire load is very typical for head and gut vessels operating in the BSAI groundfish fisheries.

Discussion: Reports written by the U.S. Coast Guard and the NTSB have substantially documented the shortcomings of structural fire protection requirements in the existing regulatory framework for fishing vessels. As this issue has been extensively reviewed in the past and this incident offers no new insights or recommendations into structural fire protection, this report will only make general recommendations regarding structural fire protection issues.

Assessment of Fire Detection Systems:

Current Regulation and Common Practice: There are not any existing regulatory requirements for commercial fishing vessels to have fire detection systems in the engine room, but they are frequently found on board. The regulatory requirement applying to the excess heat detectors, is provided in 46 CFR 28.155:

Installation of fire detection and protection equipment in excess of that required by the regulations in this subchapter is permitted provided that the excess equipment does not endanger the vessel or individuals on board in any way. The excess equipment must, at a minimum, be listed and labeled by an independent, nationally recognized testing laboratory and be in accordance with an appropriate industry standard for design, installation, testing, and maintenance.

Situation on the FPV GALAXY: The FPV GALAXY had two types of fire detectors installed on board. There were smoke detectors installed in the accommodation spaces and there were heat detectors installed in the engine room. The heat detectors installed in the engine room were of an unknown manufacture and an unknown temperature setting. The engine room units were not required to be on board either by the U.S. Coast Guard or by ABS. It could not be determined through interviews with the vessel's current and past engineers, the ABS surveyor, Aleutian Spray's port engineer, or local vendors what type of detectors were on board the FPV GALAXY. As such, it could not be determined exactly what were the maintenance, testing, and activation temperatures for the heat detectors. Most commercial detectors activate between the temperatures of approximately 175-190 degrees Fahrenheit.

Discussion: According to the vessel crew, including the Chief Engineer and Master, the heat detector alarms did not sound at the time of the fire. Failure of the units to activate could possibly be due to two factors: either the units were inoperable or the temperature in the compartment was not hot enough to activate the units. There is insufficient evidence to determine whether the units were operable or inoperable. While neither the company nor the vessel engineers had maintenance or testing programs in place to test the heat detectors they were tested annually by ABS. The heat detector units were tested during the vessel's annual ABS machinery inspection. Mr. [REDACTED] witnessed a successful test of the units by the ABS surveyor in July 2000. Mr. [REDACTED] of ABS testified the units were also tested again in

July 2001 as part of the vessel's annual machinery survey. Mr. [REDACTED] stated he had never tested the heat detectors.

Another possibility is that the temperature in the lower engine room where the units were located was not hot enough to activate the units. Under backdraft explosion tests conducted by the U.S. Navy as documented in Gottuk et al., the average compartment temperatures were typically 380-420 degrees Celcius, which is more than enough heat to activate any heat detectors available on the market. However, temperatures as low as 153 degrees Fahrenheit have been recorded in the buffer zone spaces during the U.S. Navy tests. It is possible that if the explosive and heated gases rose into the upper engine room, the temperatures may have been sufficiently cool in the lower engine room so as not to activate the heat detectors.

Based upon the analysis that the heat detectors could have been fully operational without detecting the hazard developing in the engine room, it is apparent that heat detectors alone would not be sufficient to provide early warning to the crew in the event of a developing backdraft explosion.²⁹ Because smoldering fires can produce smoke without significantly increasing room temperature, the heat detectors may not have detected the fire while it was still in the smoldering stage. An examination of eleven head and gut vessels in Dutch Harbor during January 2003 found that heat detectors were the primary fire detection system in 10 of 11 vessels.

Assessment of Fire Suppression Systems:

Current Regulation and Common Practice: If a commercial fishing vessel has a fixed fire fighting system in the engine room it must be installed in accordance with U.S. Coast Guard regulations as provided in 46 CFR Subchapter H and serviced annually. While there are no exact numbers on this, it is believed that most commercial fishing vessels, especially those participating in the BSAI groundfish fisheries, are in compliance with these regulations.

Situation on the FPV GALAXY: The vessel was equipped with a fixed CO2 fire suppression system that was installed and maintained in accordance with the regulations provided in 46 CFR Subchapter H. The system on board the FPV GALAXY was installed by Western Fire and Safety in July 1999 and was last fully serviced in July 2002 by the same company. The system was designed to protect the upper and lower engine rooms. The system was not designed or of sufficient volume to protect the adjacent refrigeration spaces. The system could be activated from two separate locations and was equipped to automatically secure the power ventilation into the engine space.

Discussion: There are several questions and issues to consider with regard to the vessel's fixed CO2 system: was the system activated, could it have been activated more quickly, would it have been effective in preventing the explosion if it had been activated?

²⁹ Under international shipping regulations, heat detection systems alone are not adequate to meet the requirements for fire protection systems.

Was the System Activated? Mr. [REDACTED] stated that although he was able to get back to the CO2 room and begin the process of activating the system, he was not able to complete this task and the system was never activated. This is confirmed by the fact that no one in the fire team heard the 120 decibel CO2 alarms go off in the engine room and the audio and visual alarm in the passage way did not activate.

Should Mr. [REDACTED] have used the remote pulls instead of the local pulls? Mr. [REDACTED] had been informed during the annual inspection of the system by the servicing technician at Western Fire and Safety, Mr. [REDACTED], that the most reliable way to activate the system was to use the local control instead of the remote controls. While the remote pulls were in the passage way and slightly closer, Mr. [REDACTED] chose to use the local pulls in the CO2 room. While he could not have known it at the time, if he had been standing in the passage way at the remote pull station when the explosion occurred, he likely would have been seriously injured or killed by the blast and ensuing fireball.

Could it have been activated more quickly? According to the testimony provided by both Chief Engineers, the policy on board the FPV GALAXY was that the CO2 system could not be activated unless the Captain had been consulted. This practice is currently taught not only in U.S. Navy and U.S. Coast Guard fire safety training, but is also taught in commercial vessel fire safety training. While this policy would be effective for all but the most extreme fire situations likely to occur on a vessel, the imminent explosion on the FPV GALAXY exposed the policy's shortcomings. Valuable time was lost when Mr. [REDACTED] raced up to the wheelhouse to notify Captain [REDACTED]. Had Mr. [REDACTED] violated company policy and standard fire fighting procedure and activated the system independently, he may have saved as much as one minute in time. Taking into account the 26-second time delay already designed into the fixed CO2 fire extinguishing system, this may have been sufficient time to discharge the system prior to the explosion. Considering that backdraft explosions are not taught in marine fire fighting school, are extremely rare, and could not have been predicted, Mr. [REDACTED] decision to notify the Captain, given his knowledge of the situation at the time, was the correct one.

Would discharging the fixed CO2 fire extinguishing system been effective fighting the fire? According to the testimony provided by Mr. [REDACTED], there was sufficient CO2 in the vessel's fire suppression system to have a significant impact on the fire even if these ducts and doors were not closed, however, the system would be most effective if all ventilation into the space (power ventilation, natural ventilation, and watertight doors) were secured prior to activation of the system.

Assessment of Survival Suit Location (In Relation to the Liferaft):

Current Regulation and Common Practice: Existing regulations under 46 CFR 28.110 (b) require that the survival suits be stowed in a location readily accessible for the person who(m) the suit is intended. The lifesaving equipment arrangements (location of survival craft in relation to the survival suits) on the FPV GALAXY were very typical for large

catcher processors and processing vessels operating in the Bering Sea. There is currently no standard in place requiring that liferafts and survival suits be located together.

Situation on the FPV GALAXY: Approximately 45 survival suits were stowed on the forward main deck, with another 5-7 stowed in the wheelhouse. Two crew members testified that they kept a survival suit in their stateroom. The total number of survival suits on board was twice the number required. The liferafts were stowed on the top deck. Under the existing regulatory guidance, the location of the survival suits in relation to the liferafts was acceptable to ABS and would have been acceptable to the U.S. Coast Guard.

Discussion: In the circumstances of the explosion and fire on the FPV GALAXY, the rapid progression from one emergency to another (explosion – MOB – fire – abandon ship) ultimately and irreversibly led to a situation where the crew on the aft top deck was isolated from the survival suits on the forward main deck following the explosion. If the crew had evacuated to the forward main deck, they would have been similarly isolated from the liferafts due to the location of the fire. In addition, if the crew had been located on the forward main deck, they would not have been able to assist in the man overboard recovery following the explosion. This likely would have led to the loss of all three members who were blown overboard.

Assessment of Survival Craft Installation:

Current Regulation and Common Practices: The liferafts on head and gut vessels are commonly located on the top deck or on top of the wheelhouse. The focus of the existing regulations is that the survival craft be equipped to float free from the vessel should the vessel sink as well as be “ready for immediate use.” The exact regulatory wording, found in 46 CFR 28.125 and 46 CFR 28.140 reads as follows:

46 CFR 28.125 (a): Each inflatable liferaft required to be equipped with a SOLAS A or a SOLAS B equipment pack must be stowed so as to float free and automatically inflate in the event the vessel sinks.

46 CFR 28.125 (b): Each inflatable liferaft, inflatable buoyant apparatus, and any auxiliary craft used in their place, must be kept readily accessible for launching or be stowed so as to float free in the event the vessel sinks.

46 CFR 28.140 (a): The master or individual in charge of a vessel must ensure that each item of lifesaving equipment must be in good working order, ready for immediate use, and readily accessible before the vessel leaves port and at all times when the vessel is operated.

For some new fishing vessels (such as the FPV GALAXY) additional requirements apply.

46 CFR 28.310: A gate or other opening must be provided in the deck rails, lifelines, or bulwarks adjacent to the stowage location of each survival craft which weighs more than 110 pounds, to allow the survival craft to be manually launched.³⁰

Situation on the FPV GALAXY: Both rafts were installed in a proper float free application. In addition, the vessel was equipped with cut outs and removable chain rails to allow the raft to be passed through the rail without lifting it over, as required by 46 CFR 28.310. However, the shape of the cradle impeded the quick launch of the raft. The size and weight of the starboard side liferaft (375 lbs) in combination with a “U” shaped raft cradle necessitated at least four people be involved in lifting the raft approximately 18 inches straight up and moving it another 15 inches to starboard in order to launch it. The port side liferaft (450 lbs) could not be launched because there were not enough crew members able to endure the smoke and flames to lift the raft out of its “U” shaped cradle.

Discussion: What is not present in the current regulatory language is wording ensuring that a liferaft can be easily launched *before* the vessel sinks. Where there are rails installed outboard of the rafts, there is currently no requirement, except as provided under 46 CFR 28.310, that the rails have cut outs or removable chains where the raft can be passed through the rail without lifting the raft over the rail. Additionally, there is currently no standard in place requiring that the liferaft launching installation be of a design whereby the raft can be launched overboard by a single person. Most raft launching configurations require two or more people, depending upon the weight and location of the raft. Because catcher processors typically have a crew from 16-50 (head and gut vessels) to over 100 (factory trawlers, floating processors) the rafts tend to be very large, weighing several hundred pounds each. An examination of eleven head and gut vessels in Dutch Harbor during January 2003 found that five of 11 vessels had liferaft installations that required that the 200+ pound rafts be lifted over a forty inch railing to launch them from the vessel. Numerous liferaft launching arrangements exist which allow the launching of the raft by a single person.

Assessment of Liferaft Embarkation Stations:

Current Regulation and Common Practice: Existing regulations for liferaft embarkation stations are found in 46 CFR 28.395 and states³¹:

46 CFR 28.395: Each vessel must have at least one designated survival craft embarkation station and any additional embarkation stations necessary so that an embarkation station is readily accessible from each accommodation space and work space. Each embarkation station must be arranged to allow the safe boarding of survival craft.

³⁰ This regulation applies to commercial fishing vessels which have their keel laid or are at a similar stage of construction on or after or which undergo a major conversion completed on or after September 15, 1991, and that operate with more than 16 individuals on board.

³¹ This regulation applies to commercial fishing vessels which have their keel laid or are at a similar stage of construction on or after or which undergo a major conversion completed on or after September 15, 1991, and that operate with more than 16 individuals on board.

Many catcher processors and processing vessels are high-sided vessels that require the liferafts be launched from a significant height. Due to this height, they must be boarded from a location not directly accessible to the liferaft launching area. A very common approach for liferaft embarkation on high-sided vessels, as was the case on the FPV GALAXY, is to launch the liferaft and then once the raft is inflated, walk the raft forward or aft to a location on the vessel where the raft can more easily be boarded.

Situation on the FPV GALAXY: The FPV GALAXY was in compliance with 46 CFR 28.395. According to testimony provided by Captain [REDACTED] two liferaft embarkation locations on the vessel had been identified. The primary embarkation station/mustering station was the aft freezer hatch area. In setting up the life saving arrangements on the FPV GALAXY, it was never the intention during the planning process to have the crew jump from the top deck into the liferaft during an emergency. It is apparent that once the crew mustered on the top deck, they were trapped there and then had no other alternative but to jump into the raft from the top deck. The fact that 12 of 13 crew members who jumped successfully made it into the raft is extremely fortunate given the height of the jump and existing sea conditions.

Discussion: There were two Jacob's ladders stowed next to the port side liferaft inside a covered box. Mr. [REDACTED] testified that he attempted to launch the port side liferaft without success. Mr. [REDACTED] made no mention of attempting to retrieve the Jacob's ladders. It is not apparent whether he was aware that the Jacob's ladders existed. During the testimony of all the crew members who were on the top deck, none mentioned the Jacob's ladders. Based upon this lack of reference to a piece of equipment that may have been used during the abandonment of the ship, it appears that the crew had no knowledge of the Jacob's ladders.

Assessment of Other Life Saving Equipment:

Personal Marker Lights (PML): The activated steady beam PML worn by Mr. [REDACTED] was not seen by two U.S. Coast Guard aircraft that were flying in the immediate vicinity of the FPV GALAXY. Both Ms. [REDACTED] and Mr. [REDACTED] stated that the U.S. Coast Guard helicopter flew right over the top of them while they were in the water. LCDR [REDACTED] stated that it was much more difficult to spot a steady beam PML than a strobe PML.

Ring Life Buoy as a Man Overboard Recovery Device: Several crew members testified that the ring life buoy, more specifically the line attached to the ring life buoy, was not of sufficient diameter to easily or quickly recover an injured person out of the water.

Liferaft Paddles: The paddles found in the liferaft bent and broke apart when used to paddle the raft toward the stern of the vessel. At the time, the raft had two people in it and was in 20 foot seas. According to the regulatory requirements provided in the 2003 Safety of Life at Sea (SOLAS) Life Saving Appliance Code regulation 4.1.5.1.6, "it should be demonstrated that with the paddles provided, the liferaft is capable of being propelled when fully lad in calm conditions over a distance of at least 25 meters." Based upon the performance of the

paddles, it appears that the existing standard for liferaft paddles is not sufficiently rigorous for typical conditions in the Bering Sea. Figure (22) below is a photograph of a paddle recovered from the liferaft used in the evacuation of the FPV GALAXY. The paddles are of plastic construction. A driver's license was included in the photograph to provide scale. Mr. [REDACTED] stated during testimony that it was his opinion that paddles for a children's raft were of more suitable construction than the paddles provided within the liferaft on the FPV GALAXY.



Figure (22): Photograph of Liferaft Paddles taken November 26, 2002.

Assessment of Safety Training and Drills:

Current Regulation: As a commercial fishing vessel operating beyond the boundary line, the FPV GALAXY was required to conduct emergency training, drills, and instruction as required by 46 CFR Part 28.265 and 46 CFR Part 28.270. The following specific regulations apply to these emergency training drills and instruction.

46 CFR 28.270 (a): The master or individual in charge of the vessel must ensure drills are conducted and instruction is provided to each individual on board at least once a month. Instruction may be provided in conjunction with drills or at other times and places provided it ensures that each individual is familiar with their duties and responses to at least the following contingencies:

- 1. Abandoning the vessel;*
- 2. Fighting a fire in different locations on board the vessel;*
- 3. Recovering an individual from the water;*
- 4. Launching survival craft and recovering lifeboats and rescue boats;*
- 5. Minimizing the effects of unintentional flooding;*
- 6. Donning immersion suits and other wearable personal flotation devices;*
- 7. Donning a fireman's outfit and a self contained breathing apparatus, if so equipped;*
- 8. Making a voice radio distress call, and using visual distress signals;*
- 9. Activating the general alarm, and reporting inoperative alarm systems and fire detection systems.*

46 CFR 28.270 (b): Drills must 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 if the vessel is so equipped.³²

46 CFR 28.270 (c): No individual may conduct the drills or provide the instruction required by this section unless that individual has been trained in the proper procedures for conducting the activity.

46 CFR Part 28.270 (d): The viewing of videotapes concerning at least the contingencies listed in paragraph (a) of this section, whether on board the vessel or not, followed by a discussion led by an individual familiar with these contingencies will satisfy the requirement for instruction but not the requirement for drills in paragraph (b) of this section or for the safety orientation in paragraph (e) of this section.³³

³² Despite the dangers posed to rescue swimmers (used in man overboard recovery) and fire team members, existing regulations do not require any formal or specialized training for crew members holding these positions.

³³ There is a significant distinction between “instruction” and “drills” as defined in these regulations. Instruction generally refers to passive observational training, whereas “drills” are to be performed “as if there were an actual emergency” and requires participation by the entire crew. Instruction in how to recover a person

46 CFR Part 28.270 (e): The master or individual in charge of a vessel must ensure that a safety orientation is given to each individual on board that has not received the instruction and has not participated in the drills required by paragraph (a) of this section before the vessel may be operated.

Common Practice in the BSAI/GOA Fleet: At a national and regional level, the U.S. Coast Guard commercial fishing vessel safety program has been aware of the lack of compliance with drills and instruction as required by 46 CFR 28.270 for several years. In 1999, national policy was revised in U.S. Coast Guard message ALDIST 162/99. This message required that U.S. Coast Guard at-sea boarding teams:

“Aggressively pursue compliance with required drills pursuant to 46 CFR 28.270. Since drills are not required to be logged, fishing vessel crew members should be queried on their knowledge of their safety equipment and its use.”

Despite this focus nationally, NMFS observer affidavits submitted to U.S. Coast Guard Marine Safety Office Anchorage over the past two years indicate that compliance with drills, instruction and safety orientation continues to be well below average in the BSAI/ GOA head and gut vessel fleet. To evaluate the compliance with existing requirements for emergency drills, reports from NMFS observers on 59 head and gut vessels were analyzed for the period encompassing January 2002 – October 2003. A total of 505 observer deployments were analyzed. Of the 505 deployments, 311 deployments were for 30 days or greater. Using this as a baseline, it was determined that no monthly drills occurred on 28% of the observer deployments lasting 30 days or greater. At least some drills were conducted on the remaining 72% of observer deployments greater than 30 days, however, the data indicates that not all drill scenarios were regularly practiced. On deployments lasting less than 30 days, the rate of drills being not being observed increased to 56%.

Table (17) below is a summary of safety violations detected by the U.S. Coast Guard at-sea boarding teams on the same 59 head and gut vessels during the January 2002 – October 2003 time frame. The source for this information was through a query of the U.S. Coast Guard’s Marine Information for Safety and Law Enforcement (MISLE) database. During this period, fifty boardings were conducted on thirty-six vessels (61% of the fleet).

A total of 18 safety violations were detected. It should be noted that despite the above average rate of non-compliance with training and drill requirements as reported by NMFS observers, U.S. Coast Guard boarding teams did not record a single violation or warning regarding emergency drills during the same time period.

Flares	Portable F/E	EPIRB	Ring Buoy	Gen Alarm	Liferaft
7 Violations	4 Violations	3 Violations	2 Violations	1 Violation	1 Violation

Figure (17): Safety Violations Detected: At-Sea Boardings on Head and Gut Vessels

Availability of Commercial Fishing Vessel Safety Training: There are numerous commercial fishing vessel safety training providers in the Pacific Northwest and Alaska which provide a

from the water does not meet the requirements for a man overboard drill. Instruction in firefighting techniques does not meet the requirement for conducting an actual fire drill.

highly professional and very wide array of training courses. It should be noted that prior to the accident on the FPV GALAXY, there were no safety training courses or safety videos designed for non-English speaking crew members.

Assessment of Training on the FPV GALAXY: According to testimony, safety training was given at the start of each fishing trip, or approximately every four to six weeks. Typically there were two fishing trips for “A” season and two fishing trips for “B” season. Based upon the testimony, there were at least three safety training sessions for the 2002 “B” season on the FPV GALAXY; one on August 1, 2002, one on September 4, 2002, and one on October 13, 2002.

- **Participation:** The level of the crew’s participation in emergency drills and instructions varied depending upon the individual crew member’s position on board the vessel. Safety training, drills, and instruction for processing and housekeeping personnel were generally limited to watching safety videos, donning survival suits, and learning where to muster. Crew members with additional responsibilities, such as the fire team, had additional instruction and training in the donning of SCBAs and fireman’s outfits or had assisted others in the donning of SCBAs and fireman’s outfits. According to testimony, Mr. [REDACTED] and Mr. [REDACTED] were generally excused by Mr. [REDACTED] from participating in the safety training and drills. Numerous crew members indicated that they had never participated in emergency drills.
- **Qualification of the Emergency Drill Conductor:** According to testimony, Mr. [REDACTED] was in charge of conducting safety training, instruction, and drills. A review of training records at the NPFVOA, Fremont Maritime Academy, and Alaska Marine Safety Education Association (AMSEA) indicate that Mr. [REDACTED] was not certificated to conduct this training. Until September 15, 1998, Mr. [REDACTED] license would have allowed him to serve as the drill conductor. However, following this date, all drill conductors needed to attend a U.S. Coast Guard approved course to become a certified drill conductor or be individually approved by the local U.S. Coast Guard Marine Safety Office. While this lack of certification or U.S. Coast Guard approval does not necessarily mean that Mr. [REDACTED] was not competent to conduct and supervise the emergency drills and instruction on board the FPV GALAXY, he was not certificated or approved to do so.³⁴
- **Record Keeping:** The safety training on board was logged and all hands were required to sign the “Mandatory Monthly Drills” sheet. The signed form implied that all drills and instruction were conducted in accordance with the regulations and each signatory crew member participated in all drills and instruction. However, testimony from the crew indicates that not all personnel who signed the sheets attended the instruction or emergency drills and that not all the drills or instruction were provided to each crew member. Several crew members testified that while they had signed the Mandatory Monthly Drill sheet, they had not practiced or participated in all the required drills or training. Mr. [REDACTED] signed the sheet, but in testimony stated that he was excused

³⁴ It should be noted that under existing regulations, the person responsible for conducting safety drills does not have to be a crew member.

from participating in the training and drills. In addition, two processors on board stated that their signature indicated that they had simply donned the survival suits and watched the safety videos. One processor indicated that he did not know what he was signing.

- **Language Barriers:** Twelve of the twenty-six people on board did not speak English as their primary language. Two crew members testified that watching the English language safety videos was not very useful because they did not fully understand the content of the video. While several Spanish speaking crew members testified that they could understand the English language videos, it is clear that receiving instruction for safety videos and emergency training in one's primary language would provide for the greatest level of understanding and education to occur. The testimony provided by Mr. [REDACTED] and Mr. [REDACTED] indicate that because they supervised the vast majority of the Spanish speaking crew, and that they themselves were Spanish speakers, the responsibility of providing safety training to the Spanish speakers generally fell on them.
- **Content of the Drills and Instruction:** Testimony indicates all personnel (with the exception of one) were familiar with the WQSB and testified they knew what their emergency assignments were. Personnel testified that they had received instruction from watching safety videos and had practiced donning survival suits. Numerous crew members testified that they were drilled in alarm recognition and where to muster. Some members of the fire team stated that they had practiced donning fireman's outfits and SCBAs and had participated in fire drills. However, six of the fifteen crew members with specific assignments on the fire team (including Mr. [REDACTED] Mr. [REDACTED] and Mr. [REDACTED] testified that fire drills were not conducted on the FPV GALAXY. Numerous crew members also testified that abandon ship drills were not conducted.

Discussion: In recent years, U.S. Coast Guard Marine Safety Detachment Unalaska has detained several vessels in port and required them to demonstrate competency in conducting satisfactory emergency drills. Even with such well-publicized enforcement actions, compliance problems abound. The problems associated with drill enforcement are multiple.

- **Not a Classification Society Issue:** For classification societies, the primary concern is the hull and machinery of the vessel. As such, drill enforcement is generally beyond the scope of the service that classification societies provide for their classed fishing vessels.
- **Lack of Opportunity during Dockside Exams:** It is often difficult for U.S. Coast Guard fishing vessel dockside examiners to assess compliance with drills on a vessel due to the lack of crew on board during an exam. It is not U.S. Coast Guard policy to require the actual performance of drills prior to issuing a fishing vessel safety decal. This policy has been adopted as a way to minimize the time needed to conduct a dockside exam and to reduce the impact of the exam on the vessel. As a result, dockside examiners rely on a simple query, "Do you conduct drills and training?" to the master to verify compliance.
- **Lack of Feasibility at Sea:** It is not Seventeenth U.S. Coast Guard policy for boarding teams to conduct drills at sea, nor is it policy to routinely check for compliance with drills and instructions during at-sea boardings beyond conducting a simple query (as noted in

the previous bullet) of the master or crew members. While the vessel is underway fishing, conducting drills for the U.S. Coast Guard is not only impracticable, but can also be dangerous.

- **Lack of Measurable Standards to Assess Compliance:** The ability to assess compliance with drills is very limited as there is a lack of clearly definable standards as to what constitutes an adequate drill in the U.S. Coast Guard's fishing vessel safety program. Under the current regulation, this lack of standards makes evaluation and enforcement of drill practices difficult. For example, a fire team that successfully dons emergency gear and conducts a drill for a galley fire as if a real emergency exists would meet the wording and intent of the regulation. At the same time, a fire team that successfully dons emergency gear and conducts a drill for a galley fire as if a real emergency exists, but fails at isolating the space, securing ventilation and fuel, and putting out the fire would also meet the wording and intent of the regulation. As another example, a vessel that only practices responding to a waste paper basket fire at various locations on board the vessel would also meet the wording and intent of the regulations.
- **Lack of Formal Training Requirements for Specialized Positions:** In particular, there are no specifically required standards or training proficiencies for rescue swimmers, fire hose team members, and personnel who may be required to wear an SCBA. These positions are of particular concern because they may require the wearing of specialized equipment and may require the individual to perform highly difficult or even life-threatening duties.
- **Confusion with Existing Regulations:** There is widespread anecdotal evidence that many vessel operators do not fully understand the scope and breadth of the training and drill requirements found in 46 CFR 28.270.

The lack of enforcement by the U.S. Coast Guard at-sea boarding team, and the lack of engagement at the dock combines to lower the operator's expectations about what the law requires for emergency drills. At best this lack of enforcement leads to misunderstanding of the requirements and at worst leads to a rejection of the requirements by vessel operators.

Another issue common to BSAI/GOA head and gut vessels and fish processing vessels is that no one on board is required to have received formal safety drill instructor training. The requirement is only that crew be trained in emergency drills and instruction. Given the large crew complement of processor on these vessels types (15-150), the organization of the crews into functionally differentiated departments (navigation, engineering, deck, processing, and hotel), and high turn over rates, it is unlikely that all training can effectively be accomplished by a person who is not on board the vessel or by one person on the vessel. In the event of an emergency, as highlighted in the FPV GALAXY incident, there is a high likelihood that that one person may quickly become so fully engaged in responding to the emergency that they may not be able to fully discharge their other emergency duties. Considering that processing workers often exceed 50% of the total crew complement, formal classroom training in fishing vessel safety and drill instruction for factory foremen and their assistants should be considered.

Assessment of Crew Response (Fire Team, Man Overboard and Abandon Ship):

The accident on board the FPV GALAXY was highly unusual in that the progression of events occurred with such severity and with such speed that every action of the crew became a critical turning point. In retrospect, it is clear that the crew of the FPV GALAXY needed to be highly coordinated, exceptionally well-prepared, needed a complete situation assessment immediately and needed additional time to control the main space fire. Only then might it have been possible to prevent the backdraft explosion. Once the devastating explosion occurred and the situation immediately transformed into a man overboard evolution, the crew was forced into a situation that they could scarcely control. The ensuing loss of command and control as a result of the death of Mr. [REDACTED] the incapacitation of Mr. [REDACTED] the isolation of Mr. [REDACTED] and the fall of Captain [REDACTED] severely reduced the ability of the remaining crew members to affect their own rescue. It was only through extraordinary heroism on the part of several key individuals and good fortune that twenty-three of twenty-six crew members survived the accident. The following sections assess the crew's responses to the fire, man overboard and abandon ship evolutions.

Fire Team Response: The crew of the FPV GALAXY were not trained, equipped or had experience as professional marine fire fighters. Based upon testimony, the vast majority of the fire team responded to the scene with hoses, extinguishers, SCBAs and fireman's outfits immediately following the detection of smoke and the activation of the fire alarm. Figure (23) is a view looking forward on the gear line.



Figure (23): Photo of Gear Line Looking Forward towards Upper Engine Room Hatch (December 2002)

It is important to note that approximately four minutes elapsed between the time that smoke was first detected and the time of the explosion. With approximately only four minutes to properly assess and respond to the emergency, there was no opportunity for mistakes. The on-scene leaders, Mr. [REDACTED] and Mr. [REDACTED] quickly attempted to find the source of the smoke, and when they did find the source, the two initially made the decision to attempt to don an SCBA and fight the fire with a portable extinguisher. In retrospect, this decision to fight the fire delayed Mr. [REDACTED] later decision to discharge the vessel's fixed CO2 firefighting system. However, within 30-45 seconds of Mr. [REDACTED] initial decision to attempt reentry, he reassessed and made the decision to discharge the vessel's fixed CO2 firefighting system. At this point, the command and control of the fire team as described in the WQSB began to break down. While most of the crew reported on scene as required, several crew members did not. In particular, [REDACTED], [REDACTED], and [REDACTED] did not report as required by the WQSB. Captain [REDACTED] noted in his testimony that he was looking for his messengers. Mr. [REDACTED] and Mr. [REDACTED] held those assignments. Instead of reporting to Captain [REDACTED] or one of the fire team leaders, they evacuated to the top deck. Also worth noting is that although the fire team reported to the scene (except as previously noted) and all the major fire fighting functions were addressed (with the exception of the messengers), not each fire team member performed their assigned functions.

In summarizing the initial response to the first two to three minutes of the fire, it is clear that while the fire team was generally familiar with their responsibilities in terms of where to report and what to bring, they were not well-practiced in organizing these resources into a highly coordinated fire response team, which was needed for a fire of this magnitude. This assessment is confirmed in the testimony of the FPV GALAXY's lead officers. Mr. [REDACTED] stated that since he has been on the FPV GALAXY, neither he nor the crew had ever conducted a fire drill. He also stated that the only training he had provided to the fire team was discussions with the Assistant Engineer about the "source of fire and the different ways of stopping (them)." While Captain [REDACTED] stated the crew had regularly practiced donning emergency equipment and breaking out hoses, Captain [REDACTED] could not recall whether or not there had ever been a main space fire drill on the FPV GALAXY.

The actions of three members of the fire team (Mr. [REDACTED] Mr. [REDACTED] and Mr. [REDACTED] also suggest a lack of understanding of proper fire fighting procedure. This may have been a result of inadequate training or misinterpretation of events. Specifically, Mr. [REDACTED] opened the hatch to the upper engine room even after it was reported that smoke was pouring from the seals on the door. Secondly, when he observed that the engines had come down, the power had gone out, and a click sound from the engine room was heard, he incorrectly assumed that the vessel's fixed CO2 system had been discharged. He made this assumption despite the fact that the 120 decibel alarm in the engine room had not sounded and the audio / visual alarm in the passageway did not activate. In making this assumption, he ordered several hatches (two on the main deck and two on the work deck) opened to provide ventilation. These two actions, especially providing ventilation to the active fire, likely were the source of the ventilation necessary for the backdraft explosion.

Man Overboard: Once the explosion occurred and the fire team was blasted into the water, the crew members who had evacuated to the top deck performed an exemplary job of

recovering two of the three men out of the water. Buoys and lines were immediately thrown into the water and Captain [REDACTED] immediately organized the crew members into multiple person teams to pull each individual out of the water. With tremendous physical effort and coordination on the part of the crew members on the top deck, two of the three were recovered from the freezing waters within minutes. It should be noted that had the crew members evacuated to the forward main deck they would not have seen the fire team go into the water. In that scenario, the fire team would have likely not been recovered with the same speed and success.

The attempted rescue of Mr. [REDACTED], especially the individual actions of Mr. [REDACTED] was heroic. As the vessel's rescue swimmer, Mr. [REDACTED] fully donned a survival suit, was secured to a life line and ring buoy, and dove into the freezing waters in an attempt to rescue his crew mate. Braving 20-foot seas and 35 knot winds, he never gave up attempting to rescue Mr. [REDACTED]. Only when he reached the point of total exhaustion and only when it was clear that Mr. [REDACTED] had already died, did he direct his attention to saving his own life. A large part of the difficulty Mr. [REDACTED] encountered may have been due to the combination of current racing past the vessel and the awkwardness of attempting to maneuver through the water in the survival suit. Additional difficulties were encountered by crew members using a ring buoy to recover an injured person (Mr. [REDACTED] out of the water. While ring life buoys are useful for keeping personnel afloat or pulling them close to a vessel, they are not useful for pulling a person out of the water.

Man overboard incidents (including gear entanglement) are the most common cause of death in the Seventeenth District among commercial fishermen for those accidents not involving the loss of a vessel (Thomas, et al., 2001). From 1991-1998, man overboard incidents accounted for 36 of 54 fatalities where there was no loss of a vessel. National statistics reflect a similar problem. At a national level from 1994 – 2000, man overboard (including gear entanglement) was the single largest cause of fatalities in the commercial fishing industry for those accidents not involving the loss of a vessel (USCG 2000).

Abandoning Ship from the Top Deck: Due to the initial explosion and subsequent fireball, Captain [REDACTED] was immediately confronted with the decision to abandon ship. Due to the life saving arrangements of the survival suits and liferafts, he was forced to prepare the crew to abandon ship without survival suits. He ordered the starboard raft to be launched and then prepared the crew by having them tie buoys to themselves. He also heroically withstood tremendous heat and sustained severe 3rd degree burns to broadcast a MAYDAY and then to retrieve survival suits from the forward deck.

Captain [REDACTED] falling from the top of the wheelhouse to the forward main deck represented a critical juncture in the abandon ship evolution as it signified the loss of command and control on the aft top deck. At that point, the five most senior crew members on board, Captain [REDACTED] (forward main deck), Raul [REDACTED] (liferaft), [REDACTED] (deceased), [REDACTED] (forward main deck), and [REDACTED] (incapacitated) were isolated from the aft top deck and could not control the abandon ship evolution. Mr. [REDACTED] testified that he was able to carry out limited communications with the aft top deck from the

raft, however due to the distance from the raft to the ship, the choking smoke, and language difficulties, his ability to fully exert command was limited.

This loss of command and control is most apparent in the testimony of Mr. [REDACTED] and Mr. [REDACTED] who disobeyed orders from Mr. [REDACTED] to provide a knife to him. Simply put, Mr. [REDACTED] called up for a knife, Mr. [REDACTED] and Mr. [REDACTED] heard him, but did not provide him with a knife, even though they both possessed a knife at that time. It is abundantly clear through the testimony of Mr. [REDACTED] and numerous others that there was nothing unusual or suspect regarding Mr. [REDACTED] request for the knife or his initial instructions not to jump. Throughout all of the crew's accounts of the evacuation of the vessel, there was no evidence offered or testimony provided that either Mr. [REDACTED] or Mr. [REDACTED] attempted to leave the others behind on the burning vessel. Quite to the contrary, the two bravely stayed on station, pleading with the crew members on the top deck to abandon ship. Several crew members testified that Mr. [REDACTED] repeatedly told the crew members in the raft to keep waiting for additional crew members to jump.

The loss of command and control is also apparent in the panic that drove [REDACTED] to evacuate the vessel by attempting to rappel down the hull of the ship, despite the objections and interventions of other crew members. Lastly, the fact that five people did not abandon ship into the raft, despite the repeated pleadings of those in the raft, is highly indicative that despite Mr. [REDACTED] intent, he could not fully influence the abandonment of the ship. Captain [REDACTED] also alluded to this loss of control and stated that if he had not fallen:

"There would not have been a situation to where somebody would tell me that they're not going to jump. I don't mean to say I would physically throw them off there, but I do believe that I would have been able to coerce them to go off that (vessel)."

Adding additional confusion to the situation, Captain [REDACTED] last order to the crew on the top deck was that no one would jump until he gave the order to do it. This last order may have additionally delayed the crew's willingness to jump.

Raft was Cut Free: Testimony from the crew members in the raft and on the top deck indicate the raft was cut free. Although no crew members ever admitted to cutting the raft, an examination of the liferaft in Kodiak, Alaska on November 26, 2002 by LCDR [REDACTED] and MST2 [REDACTED] clearly reveals the sea painter was cut. According to LCDR [REDACTED] assessment of the raft, the remaining piece of the sea painter attached to the raft was approximately three feet long. There was no evidence on the sea painter of chaffing, fraying or burning. The end of the sea painter which would have led back to the vessel appeared to be cut with a knife. Figure (24) is a photo of the sea painter for the raft recovered by the F/V GLACIER BAY on October 20, 2002.



Figure (24): Photo of the Cut Sea Painter and Raft taken November 26, 2002

It is possible that the sea painter had been cut following the raft's recovery by the F/V GLACIER BAY. Mr. [REDACTED] testified that he had removed the knife from the raft and had cut pieces off the raft as souvenirs. However, the observations of the crew (from both inside and outside the raft) at the time of the accident and the physical evidence clearly indicate that the raft had been cut free from the FPV GALAXY.

Assessment of Current Enforcement Efforts and Remaining Head and Gut Fleet:

As a 1370 gross ton fish processing vessel classed by ABS, the FPV GALAXY had among the most stringent safety regulations within the U.S. Coast Guard's regulatory regime for commercial fishing vessels. The vessel was classed, loadlined and required to have licensed officers. The vessel was also widely recognized throughout the industry as one of the top vessels in the freezer longline fleet. Other than a few technical recommendations for improving existing regulations provided in the previous analysis sections, the regulatory issues on board the FPV GALAXY were not due to lack of regulation, but instead were due to lack of effective enforcement of those regulations and a lack of clear policy guidance as set forth by the U.S. Coast Guard.

Lack of Enforcement and Policy Guidance: The U.S. Coast Guard has sufficient authority to board and enforce the regulations that apply to classed fishing vessels. Vessel inspections to ensure the seaworthiness of the vessel are not necessary as this role is filled by ABS. However, periodic examinations of vessel equipment, documentation, manning practices and

crew competency are still necessary. Despite being one of the largest and most productive vessels in the head and gut longline fleet, the U.S. Coast Guard had not conducted an at-sea boarding of the vessel since 1996 when the FPV GALAXY was still a crab processor. This lack of at-sea enforcement should be of concern. Two of the potential violations noted on the FPV GALAXY at the time of the accident, lack of properly licensed personnel and lack of properly certified personnel for conducting training, are simple compliance issues which are easily detectable and enforceable by properly trained personnel. The other potential violations, lack of a properly manned engine room and lack of adequate drills, are more problematic to enforce due to limited policy guidance and lack of enforceable standards as discussed in the previous sections.

An additional area of concern is the lack of a formalized method or means for the U.S. Coast Guard to track “significant alterations” or “major conversions” on a commercial fishing industry vessel. While the conversion on board the FPV GALAXY did not constitute a “major conversion” or a “significant alteration” as defined under existing U.S. Coast Guard regulations, there are many vessels that undergo “significant alterations” or “major conversions” which are not brought to the attention of the U.S. Coast Guard. Since July 2003 six months alone a BSAI head and gut trawler that had undergone a “significant alteration” and a BSAI head and gut longliner that had undergone a “major conversion” were not brought to the attention of the U.S. Coast Guard by the owner or operator of the vessels. Instead the changes were brought to the U.S. Coast Guard’s attention by two journalists. Proper and timely notification of such changes is necessary for the U.S. Coast Guard to apply the appropriate regulations to the vessel.

The Remaining Head and Gut Fleet: Although capable of “processing” fish as defined by 46 CFR 28.50, the FPV GALAXY was operating within a fleet of head and gut longliners. There are approximately 64 vessels (42 longliners and 22 trawlers respectively) engaged in head and gut processing operations in the BSAI/GOA groundfish fisheries. While there are a small number of head and gut vessels that rise to the level of the FPV GALAXY’s status as a classed and loadlined vessel, most do not. Because these head and gut vessels do not meet the regulatory definition of a “fish processing vessel,” the vast majority of these vessels, trawlers and longliners alike, operate without the additional safety measures of being classed or loadlined. These head and gut vessels are only required to meet the safety regulations as provided in 46 CFR Part 28, Subparts B and C. These are the same regulations that would apply to a documented small catcher vessel operating beyond the boundary line. These regulations generally require primary safety equipment and training to use that equipment in the event of an accident or emergency.

As compared to a small catcher vessel, there are significantly increased risks associated with head and gut vessels. Head and gut vessels operate with greatly increase crew sizes ranging from 15 to 49 people, they operate up to 200 miles offshore and average 2 - 6 weeks between offloads. The vessels have significant fire loads due to the carriage of boxes and fiber for packaging their product, and also operate with anhydrous ammonia or freon refrigeration systems on board.

The consequences associated with a major casualty on board a head and gut vessel are potentially far greater than a small catcher vessel and there is evidence to indicate that vessels within this fleet experience numerous near misses which do not propagate to full scale accidents. NMFS observer reports and casualty reports submitted to the U.S. Coast Guard indicate many of the vessels in the head and gut fleet routinely lose propulsion for hours at a time, have instances where unintended flooding occurs, have numerous hazardous gas leaks requiring evacuation of the processing or freezer spaces, or have small fires. Table (18) below is a summary of safety concerns documented by NMFS observers on board 59 head and gut vessels from January 2002 – October 2003.

Unintended Flooding	Losses of Propulsion	Freon or Ammonia Leaks	Fires
7	4	13	11

Table (18): Summary of Safety Concerns Documented by NMFS Observers

Given that the regulatory regime for most of these vessels is minimal, that training for emergencies is below average, and that there is evidence that initiating events for potential major accidents are commonplace, a review of these vessel's status within the existing safety regime should be considered.

Future of the BSAI/GOA Head and Gut Fleets: In the near future, it is likely that many of the fisheries in which head and gut vessels participate will be rationalized through legislation or through the North Pacific Fishery Management Council process. A primary goal of fishery rationalization is to reduce the harvesting capacity of the fishing fleets. As was the case with BSAI pollock and BSAI crab fisheries, it is very likely that a reduction in the number of vessels will be a desired outcome of any rationalization plan for the head and gut vessel fleet. Both head and gut vessel gear sectors, longliners and trawlers alike, have been working to develop legislation for rationalizing their fishery / gear groups. In 2004 federal legislation was passed which will authorize a \$50 million industry funded buyback program to reduce harvesting capacity within this fleet. It is in the interest of the U.S. Coast Guard, the NMFS, the fishing industry and the public that the vessels remaining following rationalization be the safest and most efficient vessels within the fleet.

13. CONCLUSIONS

Cause and Origin of the Fire and Explosion

1. The fire on board the FPV GALAXY originated in the engine room.
2. The explosion on board the FPV GALAXY was a backdraft explosion occurring from the engine room.
3. The ignition source and fuel source of the fire cannot be determined given the existing evidence.
4. There is no evidence to suggest that the vessel's anhydrous ammonia system, hydraulic system or pressure vessels containing oxygen, acetylene or propane caused or contributed to the initial explosion.

Licensing, Manning and Watch Standing Issues

5. Captain [REDACTED] and [REDACTED] were properly licensed for their positions on the FPV GALAXY as Master and Chief Engineer respectively.
6. There is sufficient evidence that [REDACTED] was operating with an expired license as Chief Mate on board the FPV GALAXY at the time of the casualty, a possible violation of 46 CFR 15.810(c).
7. There is no evidence to suggest that the expiration of [REDACTED] license five days before the casualty in any way contributed to the cause or severity of the casualty.
8. There is sufficient evidence that [REDACTED] was not properly licensed as Assistant Engineer on board the FPV GALAXY at the time of the casualty, a possible violation of 46 CFR 15.825(a).
9. There is no evidence to suggest that [REDACTED] serving as Assistant Engineer on board the FPV GALAXY without a license in any way contributed to the cause or severity of the casualty.
10. The FPV GALAXY's machinery spaces were classed to the ABS standards of a "manned engine space."
11. The FPV GALAXY's machinery space was being operated to the ABS standard of a "periodically unattended engine space."
12. The engine space was not attended when the fire started.
13. It cannot be determined whether Captain [REDACTED] and [REDACTED] failure to maintain a manned engine space, especially in the half hour prior to the detection of the

smoke and fire by the crew, contributed to the severity of the casualty.

14. The U.S. Coast Guard fishing vessel safety program in the Thirteenth and Seventeenth Districts has inconsistently enforced regulations regarding the licensing requirements for Assistant Engineers on commercial fishing vessels.

Structural Fire Protection, Fire Detection and Fire Suppression Issues

15. The incipient fire escaped detection by the crew.
16. It cannot be determined whether the heat detection units in the vessel's engine room were operational at the time of the casualty.
17. Heat detectors are not designed to detect fuel vapors and may not have been sufficient to provide early warning to the crew of the incipient fire or the developing backdraft explosion.
18. The large fire load on board, including foam insulation, dunnage, wood pallets and wax-coated bags, combined with minimal levels of structural fire protection, contributed to the intensity and rapid spreading of the fire following the explosion.

Fire Team Response

19. Captain [REDACTED] immediate activation of the ship's general and fire alarm contributed to the prompt response of the fire team.
20. The fire team did not have the training background or professional knowledge to recognize that a backdraft explosion was imminent.
21. The fire team did not have the training or professional knowledge to properly respond to an imminent backdraft explosion, nor had the fire teams trained to a level to mount a highly coordinated response to the main space fire that occurred on board the vessel.
22. Three of fifteen fire team members did not report to their duties as assigned by the WQSB. This contributed to the lack of communications between the on scene leader and Captain [REDACTED]
23. The fire team incorrectly determined the vessel's CO2 system was discharged, due to a lack of communication between the Chief Mate, Chief Engineer, and the Master.
24. The ensuing actions of the fire team to provide ventilation on the main deck and work deck likely contributed to the explosion.
25. The crew on the forward main deck was not able to secure the natural ventilation into the engine room due to the extremely hot smoke pouring out of the vents and the design of

the fire dampers.

26. Given the information [REDACTED] had at the time, the decision to notify Captain [REDACTED] prior to activating the CO2 system was adequate and proper. However, the delay in acting upon this decision may have contributed to the severity of the casualty.
27. [REDACTED] decision to attempt to use the local activation mechanism located in the vessel's CO2 room was adequate and proper.
28. The vessel's CO2 system was never activated by Mr. [REDACTED].
29. Currently available U.S. Coast Guard approved safety training courses for commercial fishermen does not teach backdraft fire detection or appropriate techniques for fighting backdraft fires.
30. Neither the fire team nor other crew members were trained to recognize that a backdraft explosion was imminent and that the fire team was in extreme danger.

Man Overboard Response

31. The initial multiple man overboard incident was caused by a pressure wave generated from the backdraft explosion.
32. The crew's response from the top deck to recover [REDACTED], [REDACTED] and [REDACTED] was exceptional given the conditions and the location of the crew.
33. Although ultimately unsuccessful, the crew's response from the forward main deck to the man overboard incident involving [REDACTED] was exceptional.
34. [REDACTED] individual actions to recover [REDACTED] were extraordinarily brave and heroic.

Lifesaving Arrangements and Equipment

35. The location of the liferafts and survival suits on the FPV GALAXY was found to be acceptable to the U.S. Coast Guard and ABS prior to the casualty, but their separation made them ineffective due the unanticipated nature of the casualty.
36. The liferaft installation aboard the FPV GALAXY, though accepted by both the U.S. Coast Guard and ABS, was inadequate for quickly launching the liferafts with minimal effort by the crew.
37. The crew members on the top deck were not aware of the Jacob's ladder on the port side of the vessel. However, it is not likely that a Jacob's ladder would have been an effective method to evacuate the vessel due to the extreme heat and smoke coming off the hull.

38. Life ring buoys on commercial fishing vessels are the primary equipment required which can be used to recover a man overboard. However, a life ring is not effective in recovering an injured person from the water. In addition, the lines on the life ring buoys are of insufficient diameter to effectively pull a ring buoy and a person through the water.

Abandon Ship Response

39. The use of duct tape to tape the paddles together in the liferaft significantly affected the ability of the raft occupants to utilize the paddles within the raft.
40. The paddles inside the liferaft were inadequate for the raft's intended service and area of operation.
41. Captain [REDACTED] individual actions to broadcast a MAYDAY, obtain survival suits for his crew, launch the liferaft and prepare his crew to abandon ship even after he sustained severe burns were extraordinarily brave and heroic.
42. [REDACTED] individual actions to successfully convince twelve crew members on the top deck to jump 35 - 50 feet onto a moving target, hold his position until all willing crew members had jumped, overcome the tremendous heat and smoke pouring into the raft, and then ensure the survival of the crew in the raft once it was cut free from the vessel were extraordinarily brave and heroic.
43. The loss of [REDACTED], the incapacitation of [REDACTED], and the physical isolation of Captain [REDACTED] and [REDACTED] significantly reduced the ability of the most senior crew members to command and control the evacuation of the vessel.
44. [REDACTED]' attempt to lower himself down the side of the vessel was a panic reaction that ultimately could not be influenced by the crew members on the aft top deck or by the crew in the raft.
45. [REDACTED] properly donned a survival suit and properly evacuated the vessel.
46. The crew members occupying the doorway in the raft did not attempt to use the buoyant quoit (throw ring) to recover [REDACTED] or the other two crew members who fell into the water.
47. [REDACTED] individual actions to overcome his own injuries, give up his only chance to swim to the raft, and keep [REDACTED] afloat for approximately two hours were extraordinarily brave and heroic.

Safety Training and Drills

48. The crew of the FPV GALAXY regularly received proper and adequate safety instruction in accordance with 46 CFR 28.270 (a).
49. There is sufficient evidence that although the Spanish speaking crew members received adequate safety instructions, not all the Spanish speaking crew members fully understood the instruction due to language barriers.
50. There is sufficient evidence that Captain [REDACTED] did not ensure that all required drills were conducted by all crew members or practiced to a level to facilitate a successful response to the fire, man overboard and evacuation of the FPV GALAXY, a possible violation of 46 CFR 28.270 (b).
51. The events leading up to and following the first explosion were so rapid and so catastrophic that even if the FPV GALAXY crew had been fully practiced in the drills required by 46 CFR 28.270, the outcome of the accident would likely not have changed.
52. There is sufficient evidence that Captain [REDACTED] did not have a properly qualified drill instructor conducting safety instruction and drills on board the FPV GALAXY, a possible violation of 46 CFR 28.270 (c).
53. The ability of the U.S. Coast Guard to assess compliance with emergency drills as described in 46 CFR 28.270 is severely limited due to lack of a programmatic approach to verify compliance with those drills and a lack of standards in which to hold vessel masters and crews accountable.

Disappearance of the FPV GALAXY

54. The owner of the vessel made all possible and reasonable attempts to recover the vessel following the accident.
55. Based upon the numerous watertight doors being left open at the time the vessel was abandoned, and the extremely poor weather which occurred in the two days following the incident, it is believed that the FPV GALAXY sank on October 22, 2002.
56. The unlocated 406 EPIRB signal on October 22, 2002 from the FPV GALAXY was most likely activated due to the EPIRB being submerged in saltwater as the vessel sank.

Rescue of the FPV GALAXY Crew

57. The Coast Guard responded in a timely and appropriate manner to this incident.
58. The actions taken by LORSTA St. Paul to provide a communications watch during the Bristol Bay red king crab fishery and to serve as the initial response coordinator for the

rescue were exceptional.

59. The forward deployment of the CG6021 to Cold Bay, Alaska for the Bristol Bay red king crab fishery significantly improved the response time to the FPV GALAXY and positively affected the outcome of the rescue.
60. The PML light used by Mr. [REDACTED] and Ms. [REDACTED] was not sufficient to attract the attention of multiple U.S. Coast Guard aircraft that were flying overhead or the vessels which were circling the area.
61. The masters and crew of the F/V CLIPPER EXPRESS, F/V BLUE PACIFIC, and F/V GLACIER BAY were instrumental in the rescue and recovery of the crew from the FPV GALAXY.
62. Both the crew on the F/V CLIPPER EXPRESS and the crew on the CG6021 may have temporarily but unsuccessfully revived [REDACTED].

Regulatory Compliance and Adequacy Issues

63. Because of the changes in regulatory status associated with “significant alterations” or “major conversions,” it is necessary for the U.S. Coast Guard to be aware of these changes so that the proper regulations may be applied.
64. Galaxy Fisheries LLC properly and adequately fulfilled its responsibilities for conducting random and post-casualty drug testing both before and after the casualty.
65. Galaxy Fisheries LLC properly and adequately fulfilled its responsibilities for submitting a CG-2692 Notice of Marine Casualty to the U.S. Coast Guard Marine Safety Office Anchorage.
66. All post-casualty drug tests following the casualty were negative.³⁵
67. The FPV GALAXY was in compliance with its ABS International Loadline Certificate at the time of the casualty.
68. There is no evidence of criminal misconduct or neglect on the part of Captain [REDACTED] or [REDACTED].
69. Within the existing regulatory scheme for commercial fishing vessel safety, the FPV GALAXY was subjected by the U.S. Coast Guard to the most stringent safety regulations of all commercial fishing industry vessels.
70. The FPV GALAXY was an exceptionally well-maintained vessel that far exceeded the industry standards of safety for other vessels within the head and gut longline fishery.

³⁵ See footnote number 22 on page 93.

71. Within the remaining head and gut fleet, there are numerous other vessels which are not currently in compliance with existing emergency training regulations.
72. Given the operational risks associated with the head and gut fleet in general, and the casualty experienced on the FPV GALAXY, additional safety measures should be considered and adopted by vessel owners and operators, safety training organizations, the National Marine Fisheries Service, and the U.S. Coast Guard.
73. With the exceptions noted above there is no evidence of actionable misconduct, inattention to duty, negligence, or willful violation of law or regulation on the part of any licensed or certificated persons; nor evidence that any inspected material or equipment malfunctioned, nor evidence that any personnel of the U.S. Coast Guard, or of any government agency, or any other person contributed to the cause of this casualty.

14. RECOMMENDATIONS

Recommendations for Marine Safety Office Anchorage

1. The Officer in Charge Marine Inspection, Western Alaska should initiate an investigation into a possible violation of 46 CFR 28.270 (a)
2. The Officer in Charge Marine Inspection, Western Alaska should initiate an investigation into a possible violation of 46 CFR 28.270 (c).
3. The Officer in Charge Marine Inspection, Western Alaska should initiate an investigation into a possible violation of 46 CFR 15.810 (c)
4. The Officer in Charge Marine Inspection, Western Alaska should initiate an investigation into a possible violation of 46 CFR 15.825 (a).
5. Marine Safety Office Anchorage, along with the North Pacific Fishing Vessel Owners Association, should develop a Task Force to address existing compliance problems in the safety training, instruction and drills for the head and gut fleets of Alaska and Washington.
6. Copies of this report should be provided to owner of the FPV GALAXY, Captain [REDACTED], [REDACTED], the families of the deceased, the Commercial Fishing Industry Safety Advisory Committee, and the Executive Director of the North Pacific Fishery Management Council.
7. This report should be given wide dissemination throughout the North Pacific commercial fishing industry including the National Marine Fisheries Service observer program, various fishery news organizations, the North Pacific Fishing Vessel Owner's Association, the Alaska Marine Safety Education Association, the Groundfish Forum, and the North Pacific Longline Association.

Recommendations for the Seventeenth Coast Guard District

8. The Seventeen Coast Guard District, along with Coast Guard Headquarters, and representatives from ABS and DNV, should initiate and develop policy guidance to address and clarify existing requirements for manning and watch keeping on board head and gut and fishing vessels and fish processing vessels less than 1600 GT. This policy should include, but not be limited to, clearly defining the terms "manned engine space" and "periodically unattended machinery space." Any new policy guidance should complement the statutory and regulatory language defining the term "Watch" as found in 46 USC Chapter 81 and 46 CFR Part 15.
9. The Seventeenth Coast Guard District should recognize the extraordinarily brave and heroic efforts of Captain [REDACTED], [REDACTED], [REDACTED] and

- [REDACTED]
10. The Seventeenth Coast Guard should consider providing public service awards to the masters and crews of the F/V BLUE PACIFIC, F/V GLACIER BAY, and the F/V CLIPPER EXPRESS.
 11. The Seventeenth Coast Guard District should develop multiple safety alerts for the lifesaving, fire detection, and fire team response issues which were documented in this investigation.
 12. The Seventeenth Coast Guard District Office of Search and Rescue (OSR) should direct all rotary wing aircraft with a qualified SAR aircrew on board and all underway major cutters, patrol boats, and buoy tenders to carry automatic external defibrillators.

Recommendations to the North Pacific Fishery Management Council

13. In developing future fishery rationalization alternatives for the BSAI/GOA groundfish FMPs involving head and gut vessels, the North Pacific Fishery Management Council should consider utilizing the authority provided in National Standard 10 and recommend that all head and gut vessels which remain in these fisheries following rationalization meet additional safety standards as recommended by the U.S. Coast Guard.

Recommendations to the Commercial Fishing Industry

14. In the absence of new regulations, all fish processing vessels and head and gut vessels should voluntarily adopt Recommendations 19 - 26.
15. Safety training organizations approved by the U.S. Coast Guard should develop safety videos and training programs for non-English speaking commercial fishing employees to ensure that all non-English speaking crew members are familiar with their emergency responsibilities and duties.
16. Commercial fishing vessel owners and operators should provide drill instructor training for lead non-English speaking factory and fish processing personnel to ensure that all non-English speaking crew members are familiar with their emergency responsibilities and duties.
17. Commercial fishing vessel owners and fishing vessel organizations should recommend to the North Pacific Fishery Management Council and National Marine Fisheries Service that head and gut vessels remaining in any future rationalized fisheries meet additional safety standards as recommended by the U.S. Coast Guard.
18. For vessels where it is the policy to notify the master of the vessel prior to discharging the vessel's CO2 system, vessel owners should install an independently powered emergency communication system between the wheelhouse and the CO2 room, to allow immediate emergency notification communication to the wheelhouse.

Recommendations to U.S. Coast Guard Headquarters

19. The U.S. Coast Guard should develop regulations, under the provisions of 46 USC 4502(b)(2)(G), for all fishing vessels where an individual liferaft weighs 200 pounds or more, to install liferaft launching arrangements where that raft can be launched by a single person.
20. The U.S. Coast Guard should develop regulations, under the provisions of 46 USC 4502(b)(2)(G), to require engine room fire detection and monitoring equipment on all new and existing fish processing vessels and head and gut vessels. These detection systems should have monitors or alarms installed in both the wheelhouse and engine room monitoring stations and should be tested monthly.
21. The U.S. Coast Guard should develop regulations, under the provisions of 46 USC 4502(b)(2)(G), to require that vessels be equipped with embarkation ladders for each survival craft on board. This is recommended for high-sided head and gut vessels and fish processing vessels where the survival craft or embarking station is located at heights greater than 15 feet above the waterline.
22. The U.S. Coast Guard should develop regulations, under the provisions of 46 USC 4502(b)(2)(G), to require that all personal marker lights for survival suits be of the strobe variety and be designed so that the user may activate the light with one hand. This recommendation is for all commercial fishing vessels operating in cold waters.
23. The U.S. Coast Guard should develop regulations, under the provisions of 46 USC 4502(b)(2)(G), to require that man overboard recovery devices (in addition to liferings) be required on all documented commercial fishing vessels operating beyond the boundary line.
24. The U.S. Coast Guard should develop regulations to require that more than one person on board a commercial fishing vessel be trained as a drill instructor in accordance with 46 CFR 28.270 for crews greater than sixteen people.
25. The U.S. Coast Guard should develop additional safety training practices, guidelines, and recommendations for fire team members on commercial fishing vessels equipped with SCBAs and firemen outfits and for commercial fishing vessels which utilize rescue swimmers.
26. The U.S. Coast Guard should develop regulations requiring vessel owners and naval architects to report significant alterations and major conversions on commercial fishing industry vessels to the U.S. Coast Guard.
27. The U.S. Coast Guard, through the International Maritime Organization, should develop regulations to require that liferaft paddles in SOLAS A and SOLAS B rafts be designed of a material suitable for use in life threatening and emergency situations.

28. The U.S. Coast Guard should make technical corrections to 46 CFR 28.265, 46 CFR 28.270, and 46 CFR 28.275 to further clarify and simplify the existing requirements for safety instructions, training, and emergency drills.
29. The U.S. Coast Guard should seek legislative authority to provide a new and separate definition of “head and gut fish processing vessel” in 46 USC 2101 (11). This new definition should include fishing vessels currently engaged in head and gut processing operations with more than 16 people on board.
30. The vessels affected by Recommendation 29 should have additional modest regulations developed to improve standards for evacuation of crew members, fire detection and monitoring equipment, training of crew members and watertight integrity.
31. The investigating officer recommends that this casualty investigation be closed.

15. REFERENCES

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