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United States
Coast Guard



The **COAST GUARD** Journal of Safety
& Security at Sea
PROCEEDINGS
of the Marine Safety & Security Council

Winter 2010 - 11

Fishing Vessel Safety

Stability

**Watertight
Integrity**

Seaworthiness

Survivability

**Safety
Training**

EPIRB

Also inside:

**New Requirements:
Commercial Fishing Industry Vessels**

Lessons Learned from Casualty Reports

PROCEEDINGS



Winter 2010-11

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Lessons Learned



from **Casualty Investigations**



Assistant Commandant's Perspective

By RADM PAUL ZUKUNFT

U.S. Coast Guard Assistant Commandant for Marine Safety, Security and Stewardship

Recent reality television shows have raised awareness among the general public of the dangers associated with commercial fishing. For those of us in the maritime community, however, commercial fishing safety has been a long-known concern. While the trend in the maritime and national workforces over the last century has been toward increased safety and reduced casualties as working conditions improve and safety requirements have been implemented, the commercial fishing industry continues to lag behind.

The Commercial Fishing Industry Vessel Safety Act of 1988 was the first legislation to address fishing vessel safety. Since its inception, the number of vessel losses and fatalities occurring each year has been cut by over half, demonstrating the merit of prevention. Despite this progress, a recent preliminary Department of Labor finding indicates that the fatal injury rate for fishers and fishing-related workers, at 200 per 100,000, is the highest of any occupation.¹ That number stands in sharp contrast to the fatal injury rate for all workers at 3.3 per 100,000, and necessitates a call for action. The Coast Guard 2010 Authorization Act provides one additional vehicle to improve fishing vessel safety.

The contributors to this issue are many and varied, demonstrating the whole of government and NGO approach to improving fishing vessel safety. An article by the National Institute for Occupational Safety and Health provides a scientific perspective on safety issues in the fishing industry. Experts in fishing vessel training from the North Pacific Fishing Vessel Owners' Association, Alaska Marine Safety Education Association, and Fish Safe Program in British Columbia provide insight on fisherman safety education. Other contributors include members of our Commercial Fishing Vessel Safety Division at Coast Guard headquarters, Fishing Vessel Safety Coordinators and leaders from Districts 13 and 17, and numerous other fishing industry stakeholders.

This issue also includes a summary of the fishing vessel safety provisions in the Authorization Act, which notes their impact on the industry and outlines tentative plans for implementation. Although many of the articles in this issue were written before the Coast Guard Authorization Act was signed, and some may contain information that will change in minor ways as a result of the act, the information is still timely, relevant, and vital to addressing fishing vessel safety issues.

Enjoy this issue of *Proceedings*! Let's make it our goal in the next commercial fishing safety edition to celebrate a significant decrease in commercial fishermen injured or lost in their profession.

Endnote:

¹ Bureau of Labor Statistics, U.S. Department of Labor (2010). National Census of Fatal Occupational Injuries in 2009 (Preliminary Results).

ADM Robert J. Papp Jr.
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Champion's Point of View



By RADM KEVIN S. COOK
U.S. Coast Guard Director of Prevention Policy

This is an exciting and busy time in the prevention community. The Coast Guard Authorization Act of 2010 was four years in the making and contains provisions that will require an estimated 40 rulemaking projects for the Coast Guard. As Director of Prevention Policy, perhaps the area of greatest interest for me is the expansion of the Coast Guard's authority and involvement with commercial fishing vessels.

Among its provisions, the Coast Guard Authorization Act requires fishing vessels operating more than three nautical miles beyond the baseline to be examined at least once every two years. There are currently about 12,000 vessels subject to Coast Guard inspection. Compare that to the number of fishing industry vessels that will have to be examined. Based on numbers provided by each Coast Guard district, there are an estimated 35,000 fishing industry vessels operating beyond three nautical miles of the baseline. It is clear that these new requirements will require a multi-pronged approach to mandatory safety examinations.

I believe that these examinations working in conjunction with the other provisions of the Coast Guard Authorization Act provide a framework for an enhanced safety effort that can bridge the gap between commercial fishing and other maritime industries. Up until now, the Coast Guard's Fishing Vessel Safety Program has relied on voluntary dockside exams to identify deficiencies and at-sea boardings to enforce the safety regulations. Much of our effort involved conducting outreach and convincing fishing vessel owners to accept a safety exam, with only a fraction of fishing vessels actually completing an exam each year. But with implementation of the Authorization Act, the dynamics of the program will change. Mandatory dockside safety exams for fishing vessels operating more than three nautical miles from shore means compliance with safety regulations will be a prerequisite to operation of these vessels. Fishing vessel owners now will have to seek out examiners, where it might have been the other way around in the past.

Our aim is to reduce the number of fishing vessel casualties and fatalities. We know that about half of all fatalities occur as a result of a vessel loss. We want to prevent the casualty, not have to react to it. We will have to draw on the lessons of the past, capitalize on research, team with industry to provide realistic solutions, and ensure that our personnel have the knowledge and ability to carry out our policies. As you read this issue, consider your role in fishing vessel safety and what we can do to make this program as successful as possible. It will take effective teamwork, creativity, and resolve from all involved in this effort to make safety in the fishing industry what it ought to be.

We do not want the commercial fishing industry to continue to be the most hazardous occupation in the country, and it would be nice to see a new name for the "Deadliest Catch" reflecting a safer industry. Join me in making prevention of casualties on commercial fishing vessels a priority and a reality. "FishSafe!"



Commercial FISHING VESSEL



SAFETY

Fishing Vessel Safety

Where we've been, where we're headed.

by CAPT ERIC CHRISTENSEN
Chief, U.S. Coast Guard Office of Vessel Activities

MR. JACK KEMERER
Chief, U.S. Coast Guard Fishing Vessel Safety Division

It has been more than 20 years since the Commercial Fishing Industry Vessel Safety Act of 1988 was passed, and almost that long since the 1991 Requirements for Commercial Fishing Industry Vessels were promulgated in regulation under 46 CFR Part 28. The act and implementing regulations were designed to give fishermen safety equipment, emergency systems, and a minimum level of instruction to help them survive a vessel casualty at sea until help could arrive.

After the Safety Act and Regulations

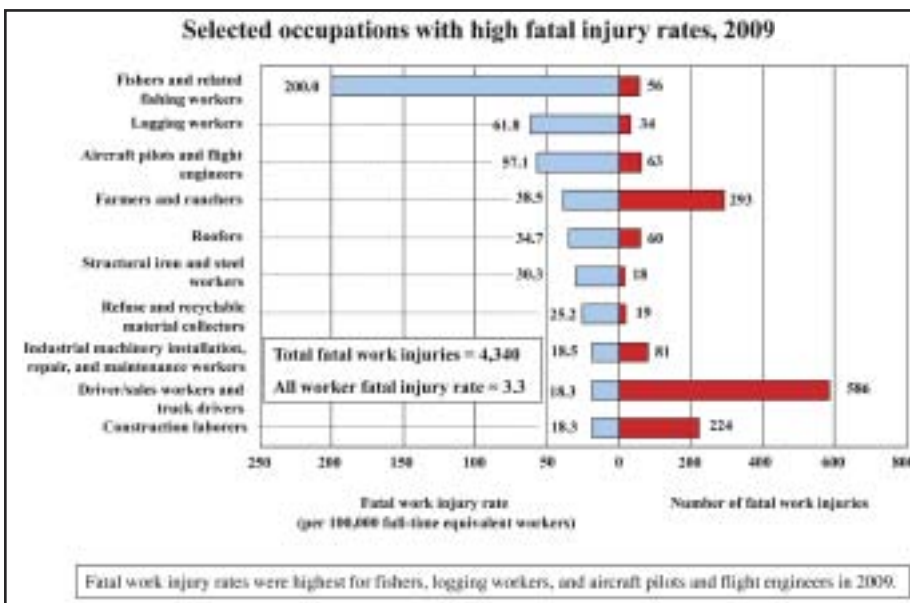
Over the years since the 1988 act and 1991 regulations, the Coast Guard has made many attempts to improve

safety in the commercial fishing industry—some yielding success, and some not. Subsequent to the requirements and standards becoming effective, data shows a significant reduction in the number of vessels and fishermen's lives lost each year.^{1,2}

To put this in perspective, during the 10-year period prior to the act and regulations, an average of well over 200 vessels and more than 100 fishermen were lost annually. For the 10-year period after the safety regulations were implemented, the average number of vessel losses decreased to approximately 140 per year, while the annual fatality average dropped to approximately 70. In the past 10 years, the annual vessel loss average has dropped to under 90, and the fatality average has declined to approximately 45 per year.

The Coast Guard submitted a report and recommendations in 1992 for both the licensing of operators on commercial fishing vessels and a plan to require the inspection of fishing vessels. Neither the licensing plan nor the inspection plan received congressional action. Follow-on rulemaking projects after the 1991 regulations were initiated in 1992, 1995, and 1998 regarding immersion suits and stability requirements; however, they were later withdrawn.

To carry out the Commercial Fishing Vessel Safety (CFVS) Program, the Coast Guard established 61 positions assigned to head-



Over the past several years, fishermen have topped the list of “most dangerous occupations” in the United States. Source: U.S. Bureau of Labor Statistics, U.S. Department of Labor, 2010.

quarters, district offices, and marine safety offices (now sectors) in the mid-1990s. With the absence of authority to regulate commercial fishing industry vessels as inspected vessels, the Coast Guard embarked on an outreach and education campaign.



- conducting research and development,
- informing fishermen on safety issues.

Subsequent to the task force report and recommendations, the Commercial Fishing Industry Vessel Safety Advisory Committee and district CFVS coordinators met

Voluntary dockside safety examinations remain the hallmark of the campaign. During a voluntary examination, a Coast Guard examiner works with owners, operators, and crew to explain requirements, check compliance with federal regulations, and assist the crew in correcting deficiencies, when possible. Discrepancies are brought to the attention of the vessel operator, but no penalty action is initiated. If the vessel is found to be in compliance with all requirements, a safety decal is issued to the vessel that may be valid for up to two years.

A Task Force on Casualties

In the first few years of implementing the CFVS Program, less than 10 percent of fishing vessels were completing voluntary dockside safety examinations. Soon after, a series of incidents spurred new interest in safety and intervention. During a three-week period between the end of December 1998 and the middle of January 1999, four vessels were lost and 11 fishermen died off the East Coast.

The Coast Guard responded by chartering a Fishing Vessel Casualty Task Force comprised of representatives from various Coast Guard offices, the National Transportation Safety Board, the National Oceanic and Atmospheric Administration, the National Marine Fisheries Service, the Occupational Safety and Health Administration, and several advisors from the fishing industry. The task force evaluated the casualties and recommended measures to reduce the loss of life and vessels. Its report "Living to Fish, Dying to Fish" was released in April 1999 with 59 recommendations to improve safety, including:

- coordinating fishery management with safety,
- establishing operator and crew standards,
- ensuring vessels comply with standards,
- establishing safety and stability standards,
- improving [CFVS] program management,

to review the report and develop a long-term action plan for the CFVS Program. Because several items in the developed action plan were not well-supported in the past, the Coast Guard held regional listening sessions to receive public comments on the action items identified in the plan. Surveys were also distributed to obtain feedback and information from fishermen on actions to enhance safety.

To further promote safety and improve outreach in the industry, and following a recommendation of the task force, the Coast Guard established more than 40 additional positions in the CFVS program. These new assignments at field units added personnel who could conduct vessel safety examinations, assist in training fishing crews, and train boarding officers, who could check for vessel compliance.

At about this same time, CFVS coordinators and examiners began focusing on identifying fishing vessels that could be considered high-risk based upon their condition, area of operation, or the fishery in which they were involved. Examiners increased outreach to these targets to gain access and conduct dockside safety examinations. To further focus on high-risk fisheries, such as the Alaska/Bering Sea crab fishery, the Coast Guard began deploying personnel to key port areas prior to a season opening to conduct safety compliance checks. These checks did not constitute a full safety examination; they focused on safety and survival equipment being in serviceable condition, stability conditions, and other conditions of the vessel that could lead to downflooding. These pulse operations were adopted for vessels in other areas of the country with high-risk fisheries and operating environments with positive, casualty-reducing results.

Training Promoted

Numerous organizations such as the North Pacific Fishing Vessel Owners Association, the Alaska Marine Safety Education Association, and state sea grant pro-



grams have been providing safety and awareness training programs for over 25 years. To provide training and encourage fishermen's participation in the CFVS Program, the Coast Guard staged damage control training trailers, damage stability trainers, intact stability trainers, and emergency position-indicating radio beacon (EPIRB) test kits around the country in the 1990s. The Coast Guard also offered safety and awareness training programs in various port areas, in fishing communities, and to industry groups. Many other programs exist that train fishermen and individuals to serve as drill conductors on fishing vessels.

There have been various recommendations on enhancing safety for and competencies of fishermen through training. In a 1987 study, "Uninspected Commercial Fishing Vessel Safety," and marine accident reports, the National Transportation Safety Board recommended that minimum safety training standards be established for fishermen. In 1991, the National Research Council report "Fishing Vessel Safety, Blueprint for a National Program" recommended requiring education and training with certification. And in 1997, the National Institute for Occupational Safety and Health recom-

casualty investigations over the years. Common themes in the investigation reports include enhancing and expanding safety orientations, emergency instructions, and survival training requirements. Additional training topics and areas recommended for fishermen include:

- fire prevention and firefighting,
- damage control,
- stability,
- navigation safety,
- survival awareness.

Increased awareness and greater emphasis on safety after the casualty task force report coupled with continued vessel losses and crew fatalities off New England sparked fishing industry groups, local communities, and government agencies to partner in developing and conducting safety and survival training workshops and programs. This was first implemented in New Bedford in October 2005. It was so well received that the training program was expanded and has become a model for programs in other parts of the country. Still, it was not mandatory.

New Authorities Sought—and Gained

In response to numerous safety studies and reports and a renewed awareness and interest in training for crews and safety of vessels, the Coast Guard began requesting additional regulatory authority in 2005 through legislative change proposals. Specifically, we proposed a pilot project for mandatory safety examinations in areas of the country where casualty rates were the highest. We also began seeking requirements for crew training and new or upgraded types of safety equipment.

Re-enforced by a number of casualties with multiple fatalities in 2006 and 2007, there developed a new congressional interest in fishing vessel safety. As a result, the House passed H.R. 2830 in 2008. The bill would have made some significant changes in requirements for the industry and authorities for the Coast Guard, including:

- treating documented and state-registered vessels the same for requirements;
- establishing three nautical miles (NM) from the baseline as the operating boundary for equipment;
- making dockside safety examinations mandatory (vessels operating beyond 3NM of the baseline);
- adding new equipment and training requirements;

continued on page 10



mended that basic fishing safety training be completed by fishermen. Also, the 1999 casualty task force recommended required refresher training for drill conductors and crew competency requirements be instituted.

Many safety recommendations having to do with training resulted from commercial fishing industry vessel

Recent Fishing Vessel Casualties

Even with a re-invigorated interest in and action on fishing vessel safety, serious casualties have continued.

In April 2001, the *Arctic Rose*, a 92-foot steel-hulled trawler/processor, was lost off St. Paul, Alaska with 15 crewmembers dead or missing. In October 2002, the *Galaxy*, a 171-foot steel-hulled long-liner/processor, suffered a fire and explosion in the Bering Sea, leaving three crewmembers dead or missing. Then in 2003, the *Atlanta* capsized and sank off Chatham, Mass., leaving three crewmembers dead, and the *Candy B II* sank off Nantucket, leaving four dead.

Every year since then, at least one significant vessel casualty occurred leaving multiple crewmembers dead or missing, including:¹

- 2004 – *Northern Edge* capsizes and sinks off Nantucket, five fatalities;
- 2005 – *Big Valley* sinks in the Bering Sea, five fatalities;
- 2006 – *Ocean Challenger*, *Catherine M*, and *Ash* capsize and sink off Alaska and the Oregon coast; three, three, and four fatalities, respectively;
- 2007 – *Lady Luck* and *Lady of Grace* sink off New England, two and four fatalities;
- 2008 – *Katmai* and *Alaska Ranger* sink in the Bering Sea, seven and five fatalities;
- 2009 – *Patriot* and *Lady Mary* sink off Mass. and N.J., two and six fatalities;
- 2010 – *Majestic Blue* sinks in the central Pacific, two fatalities.

Endnote:

¹ Marine Information for Safety and Law Enforcement database.



Majestic Blue



Lady Mary



Ocean Challenger



Lady Luck



Lady of Grace



Galaxy

U.S. Coast Guard photos.

Safety Statistics

Vessel losses have been the leading cause of fatalities over the years.

Falls overboard account for the second-highest cause of fatalities in the industry. Between 2000 and 2009, falls overboard led to 155 deaths.¹

Significant in this statistic: Not one of the dead was wearing a personal flotation device.

Endnote:

¹ "Commercial Fishing Deaths-United States, 2000-2009," Morbidity and Mortality Weekly Report (MMWR), July 16, 2010.

- expanding stability, classification, and load line requirements for fishing vessels;
- establishing grant programs for training and research;
- reauthorizing and expanding the advisory committee.

In 2009, the same provisions were included in H.R. 2652, but again the bill did not become law. However, in September 2010, H.R. 3619 was passed by Congress and the president signed the Coast Guard Authorization Act of 2010 on 15 October 2010. The provisions noted above are key portions of the act that will impact safety on commercial fishing vessels and give the Coast Guard additional authorities. When implemented, we fully expect these new requirements will help reduce vessel losses and crew fatalities, so that commercial fishing is no longer the most hazardous occupation in the United States.

Others Embrace Safety Requirements

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) requires fishery observers aboard vessels fishing under certain permits. In an effort to monitor by-catch and ensure these vessels were safe for carriage of the observers, NMFS proposed a rule in 2006 clarifying the requirement for a Coast Guard safety examination that had already been in effect since 1998. This rule became final in 2007, so now any vessel subject to observer carriage must successfully complete a Coast Guard dockside safety examination and be issued a safety decal. The observers also complete a vessel safety checklist to ensure all critical safety and survival equipment has been checked and tested in accordance with the regulations. Further, they complete a safety orientation, review safety instructions, or participate in a drill on the vessel.

Regional fishery management councils develop fishery management plans. Under the Magnuson-Stevens Fisheries and Conservation Management Act, the councils are required to ensure that their conservation and management measures also promote the safety of human life

at sea. The Coast Guard is a non-voting member on each of eight regional councils. Our representatives aid fisheries managers in addressing various management alternatives by providing them with expert advice on the operational realities of at-sea law enforcement, as well as vessel and crew safety. We will continue to champion safety in fisheries management regimes and provide information and recommendations from our Commercial Fishing Industry Vessel Safety Advisory Committee.

Additionally, several states are partnering with the Coast Guard to promote fishing industry safety. Initiatives such as requiring crew training and safety checks on vessels with state permits are examples of programs that are already in effect or being considered. Tribal nations on the Great Lakes have instituted fishery management and enforcement programs. The Coast Guard has memorandums of agreement with several tribes to provide enforcement officer and examiner support and training and to promote safety programs for tribal fishermen.

The Way Forward

While the Coast Guard and industry have made significant strides in improving safety and survival of fishing vessels and crews, the Department of Labor's Bureau of Labor Statistics has listed "fishers and related fishing workers" as the occupation with the highest fatality rate for the past five years in a row. The latest report on fatal occupational injuries indicates that the fatality rate in the fishing industry is much higher than the average rate for all workers (see chart on first page of article).

With all the efforts to improve safety in the commercial fishing industry, there remains much that can still be accomplished to reduce the loss of life and vessels, even with the additional authority and new requirements in the 2010 Authorization Act. As long as commercial fishing is the most hazardous occupation in the country, the goal of the Fishing Vessel Safety Program will be to increase the level of safety so that it is no more dangerous than any other segment of the maritime community. We can go a long way in effecting this by:

- Increasing the rate of safety compliance with existing standards and requirements through additional education and outreach programs. Promoting, supporting, and helping facilitate existing safety awareness and crew competency training programs will raise the knowl-

edge and skills of all fishers. We need to encourage new and expanded programs, whether community-based or offered by industry organizations.

- Expanding and developing better lines of communication with the industry. Established websites such as the Coast Guard's www.fishsafe.info and <http://homeport.uscg.mil> and numerous industry sites can be made more visible and marketed to fishermen to make them more aware of available resources.
- Expanding awareness and distribution of safety information fliers, alerts, and references to fishermen during dockside contacts and promoting their availability on the above websites and in trade publications.
- Expanding the dockside examination program to the fullest extent resources permit. As mentioned previously, less than 10 percent of fishing vessels were completing voluntary dockside safety examinations shortly after the CFVS Program began, and unfortunately, this is still the case today. Increasing the number of qualified examiners in the Coast Guard Reserve and Auxiliary ranks will provide additional capacity and capability. Over the past five years we have been averaging more than 7,000 dockside exams and we will strive to increase that level by 10 percent per year until the mandatory exam requirement can be implemented. Mandatory exams are estimated to be applicable on about half the fleet, or approximately 35,000 vessels. We will also seek to increase compliance on vessels not required to complete an exam.
- Increasing compliance with and enforcement of safety regulations through risk-based "safe catch"-type operations and targeting high-risk/high-casualty fisheries. Vessels found with especially hazardous conditions should be required to correct deficiencies before getting underway, or their voyages terminated if at sea. Compliance boardings at sea have been averaging over 7,000 per year. Again, we should seek to increase this number as resources and operational tempos allow.

- Improving industry risk management practices and promoting a heightened safety culture with fishermen. Outreach and education programs will help facilitate this effort.
- Partnering with fisheries resource managers to reduce risk by embracing safety considerations in all fishery management plans and policies. Increasing our visi-

New Requirements Considered

After the rulemaking projects regarding immersion suits and stability requirements were initiated and then withdrawn in the 1990s, a new regulatory project began in 2003. Work progressed slowly and it became evident that the Coast Guard needed additional information and feedback from the industry and public on requirements that might be considered in the rulemaking project, based on recent studies and safety recommendations.

An advanced notice of proposed rulemaking (ANPRM) was published on March 31, 2008 and the comment period closed on July 29, 2008, but was reopened on August 13, 2008 until December 15, 2008. Two public hearings were held in Seattle, Wash., on November 21 and 22, 2008.

The ANPRM discussed the history of Coast Guard rulemaking under the Commercial Fishing Industry Vessel Safety Act of 1988 and the need for further rulemaking. Thirty questions were posed for public comment that could be grouped into the following general topic areas:

- stability and watertight integrity,
- causes of vessel loss other than stability and watertight integrity,
- risk awareness,
- training and drills,
- safety and survival equipment,
- regulatory costs and benefits.

Comments received in response to the ANPRM and the public hearings, information from recent studies and reports, and safety recommendations from fishing vessel casualties are all being considered as we move forward with the rulemaking project. At the time of this writing, and in response to the passage of the Coast Guard Authorization Act of 2010, the rulemaking is being internally reviewed and may be revised before administrative review.

bility and participation at regional management council meetings are an integral part of this effort.

Authors' note:

Discussions on several of the topics in this article were not extensive, as there are other articles in this edition that provide more detail.

About the authors:

CAPT Christensen's earliest exposure to commercial fishing vessel safety was as the first Commercial Fishing Vessel Safety Coordinator at Marine Safety Office Portland, Ore., from 1992 to 1994. A 1987 graduate of the California Maritime Academy, he has spent his career dedicated to marine safety, culminating in his assignment as Office of Vessel Activities Chief at Coast Guard headquarters.

Mr. Kemerer served as the 1996-1997 Fishing Vessel Safety program manager prior to retiring from active duty with the U.S. Coast Guard. After employment in the private sector, he returned to the Coast Guard as a Commercial Vessel Safety Specialist in the Office of Vessel Activities, Fishing Vessel Safety Division at Coast Guard headquarters, and later was appointed as the division chief.

Endnotes:

¹ "Living to Fish, Dying to Fish," Fishing Vessel Casualty Task Force Report, March 1999.

² "Analysis of Fishing Vessel Casualties," U.S. Coast Guard, October 2008.



The Coast Guard Authorization Act of 2010*

New requirements for commercial fishing industry vessels.



Parity for All Vessels

Uniform safety standards are established for all vessels, particularly those vessels operating beyond three nautical miles of the baseline of the territorial sea and coastline of the Great Lakes. In Title 46 U.S.C. §4502(b)(1) “documented” is deleted, so there will no longer be different standards for federally documented and state-registered vessels operating on the same waters. Additionally, 46 CFR part 28, subpart C must be amended to reflect the change.

Replacing Boundary Line with Three Nautical Miles

Title 46 U.S.C. §4502(b)(1)(A) is amended by replacing “Boundary Line” with “three nautical miles from the baseline from which the territorial sea of the United States is measured or three nautical miles from the coastline of the Great Lakes.” Various sections of 46 CFR part 28 must be amended to reflect this change. The boundary line location was confusing, whereas the three-mile line is a well-known demarcation shown on most charts.

Survival Craft

All fishing industry vessels operating beyond three nautical miles are required to carry survival craft that will meet a new performance standard for primary lifesaving equipment. Title 46 U.S.C. §4502(b)(2)(B) is amended by replacing “lifeboats or liferafts” with “a survival craft that ensures that no part of an individual is immersed in water.” This means that life floats and buoyant apparatus will no longer be accepted as survival craft on any commercial fishing vessel operating beyond three nautical miles; 46 CFR part 28 must be amended to reflect this change and there could be a phase-in period for this requirement.

Records

A new provision requires that the individual in charge of a vessel operating beyond three nautical miles maintain a safety logbook—a record of equipment maintenance and required instruction and drills. Title 46 U.S.C. §4502(f) is amended to add this requirement; 46 CFR part 28 must be amended.

Examinations and Certificates of Compliance

Dockside safety examinations at least once every two years are now mandatory for vessels operating beyond three nautical miles. A certificate of compliance will be issued to a vessel successfully completing the exam; 46 U.S.C. §4502(f) is amended to add this requirement, and 46 CFR part 28 must be amended to implement it. Voluntary exams will continue to be promoted for vessels operating inside three nautical miles.

Related to this, individuals authorized to enforce Title 46 may remove a certificate from a vessel operating in a condition that does not comply with the provisions of the certificate. And, if the vessel does not have the required certificate on board, or if the vessel is being operated in an unsafe condition, it may be ordered to return to a mooring and remain there until the certificate is issued/reissued or the condition is corrected. Title 46 U.S.C. §2117 is amended to change this requirement, and 46 CFR part 28 must be amended to implement it for fishing vessels.

Training for Operators

A new provision applicable to vessels operating beyond three nautical miles requires individuals in charge of the vessel to pass a training

program covering certain competencies. This is covered in a new 46 U.S.C. §4502(g) and 46 CFR part 28 must be amended. The training must include, among other things, seamanship, navigation, stability, fire fighting, damage control, safety and survival, and emergency drills. Credit can be considered for recent experience on fishing vessels. Refresher training is required every five years. A publicly accessible database listing individuals who completed the training will be established.

Construction Standards for Smaller Vessels

Vessels built after January 1, 2010 and less than 50 feet overall in length must be constructed in a manner that provides a level of safety equivalent to the standards for recreational vessels established under 46 U.S.C. §4302. This provision is set forth in a new 46 U.S.C. §4502(h). Implementing regulations must be developed. Note: "overall in length" means the horizontal distance of the hull between the foremost part of the stem and the aftermost part of the stern excluding fittings and attachments. This is different from "registered length."

Loadlines

The act amends 46 U.S.C. §5102(b) making assignment of a loadline a requirement on fishing vessels 79 feet or greater in length that are built after July 1, 2012.

Further, in 46 U.S.C. §5103, a new paragraph (c) is added that requires fishing vessels built on or before July 1, 2012 that undergo a substantial change to the dimension of or type of vessel completed after July 1, 2012, or a later date set by the Coast Guard, to comply with an alternate loadline compliance program developed in cooperation with the industry. It is anticipated that the Commercial Fishing Safety Advisory Committee will be engaged in helping to develop alternate compliance programs here, and related to vessel classing below. Regulations must be developed to implement these programs.

Classing of Vessels

The act amends 46 U.S.C. §4503 to make it applicable to fishing and fish tender vessels in addition to fish processing vessels. A new paragraph (c) is added that requires survey and classification of a fishing

vessel that is at least 50 feet in overall length, built after July 1, 2012, and operates beyond three nautical miles. It also requires the vessel to remain "in class" and have the appropriate certificates on board.

A new paragraph (d) is added to 46 U.S.C. §4503 that requires:

- (1) development of an alternate safety compliance program by January 1, 2020 for vessels over 50 feet in length, built before July 1, 2012, and 25 years of age or older;
- (2) an alternate safety compliance program for vessels built before July 1, 2012 that undergo a substantial change after the later of July 1, 2012, or a date to be determined by the Coast Guard; and
- (3) owner(s) of 30 or more vessels subject to (1) who enter into a compliance agreement with the Coast Guard can delay meeting the requirement of (1) until January 1, 2030.

The alternative safety compliance programs are to be developed in cooperation with the industry, and may be developed for specific regions and fisheries. Further, in this new paragraph, vessels classed before July 1, 2012 are required to remain in classification and have a current certificate on board.

A new paragraph (e) is added to 46 U.S.C. §4503 that requires the Coast Guard to prescribe the alternate safety compliance program for older vessels by January 1, 2017.

Other Provisions

Title 46 U.S.C. §4502 is amended by also adding requirements for the Coast Guard to establish a Fishing Safety Training Grants Program and a Fishing Safety Research Grant Program. The grants will be awarded on a competitive basis. The federal share of the activities costs cannot exceed 75 percent.

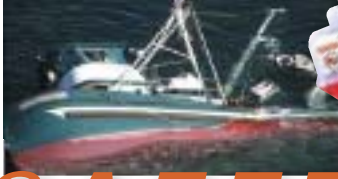
Title 46 U.S.C. §4508 is amended by renaming the Commercial Fishing Safety Advisory Committee and reauthorizing it until September 30, 2020. The committee is also expanded to 18 members and will continue to represent groups with expertise, knowledge, and experience regarding the commercial fishing industry.

*(P.L.111-281)

For more INFORMATION
For more in-depth information and full text, go to
www.fishsafe.info



Commercial FISHING VESSEL



SAFETY

Commercial Fishing Vessel Safety Program Information Online

Information sharing and outreach.

by ENS AMY DOWNTON
U.S. Coast Guard Reserve

U.S. Coast Guard Office of Vessel Activities
Commercial Fishing Vessel Division

Homeport is a secure Internet portal that provides critical information and service delivery to the public, maritime industry, and United States Coast Guard. It enables partnerships across the entire maritime com-

munity by providing secure collaboration environments over the Internet.

The official United States Coast Guard Fishing Vessel Safety Division homepage is unrestricted and open to the

public, offering current and historical commercial fishing vessel-related information. Links enable the user to access a wide range of related information, Navigation and Vessel Inspection Circulars, safety notices, and alerts. The archive section offers valuable insight into the program's formation and direction.

The main objective is to increase awareness of and compliance with fishing vessel safety requirements.¹

Helpful Hints

Here are some useful tips for navigating around the United States Coast Guard Homeport portal.

HOMEPORT
U.S. Department of Homeland Security
UNITED STATES COAST GUARD

Homeport is an enterprise internet portal that contains secure information dissemination, advanced collaboration, and provides a public-facing interface for internal Coast Guard processes. Use Homeport to:

- Access information related to marine safety security and environmental protection
- Collaborate through communities
- Review and publish documents
- Search for users, vessels, and facilities

Homeport Quick Reference Card

Tab Toolbar
Homeport Tabs Lead to Four Distinct Areas of Content

My Homeport	News	Port Directory	Library
-------------	------	----------------	---------

NOTE: SMI/SSI access is available to qualified registered users.

My Homeport: Available to registered users only. Provides customizable features like alerts, shortcuts, and easy access to your Communities. Contains Channels to Notifications and various search functions.

News: Contains local and national CG News; Maritime Security (MARSEC) and Threat Advisory levels; Alerts; and marine safety, security, and environmental information.

Port Directory: Contains information pertaining to each individual Coast Guard Captain of the Port.

Library: Contains information on Regulation, Policy, Safety, and Security.

Customizing Content and Layout

The information on the **My Homeport** tab is organized in **Blocks**. Each block contains links to Programs and Content. You can customize the Content and Layout for each **Block** by selecting the **Customize** buttons in the **Channels** on the left of the page.

Use these buttons to shift the **Blocks** between the **Columns** and up/down with in each **Column** in the **Customize Layout** channel.

Use the **Customize Content** channel to select what **Blocks** appear on the **My Homeport** tab.

Use these buttons or the check boxes in the **Show** column to select the **Blocks** you would like to appear.

Use the **Save**, **Cancel** or **Reset to Default** buttons to save or reset the layout changes that you have made.

Global Header and Help

After successfully logging-in, the Global Header and Help features appear in the top right corner of the site.

Logout | Profile | Alerts | Shortcuts | Help | Contact Us

Alerts	Opens the Alerts Interface. When you set alerts for Programs, Content, Tasks, Meetings, Announcements, and Discussions, and that content is changed, the icon turns Red , you receive an email, and the alert appears in the Alerts Interface page.	Contact Us	Opens Homeport contact information.
Profile	Opens your Homeport Profile. Here you can update your profile and change your password.	Logout	Logs you out of the registered user interface.
Shortcuts	Opens the Shortcuts Interface containing the shortcuts you track. All	Logout	Logs you out of the registered user interface.
Help	Opens the Homeport User Guide. Here you can find the answers to most of the questions/problems you could encounter while navigating Homeport.		

The User Guide also contains many Flash tutorials to help you with some of the functionality in Homeport. You can also learn some of the terminology used in Homeport by accessing the Index, Search, and Glossary Tabs located in the User Guide.

The Homeport quick reference card can be found at http://asvts.com/home/news/news_docs/qrchome.pdf.



HOW TO REGISTER FOR A HOMEPORT ACCOUNT

1. From the Homeport homepage (<http://homeport.uscg.mil>) click the “register” link in the upper-right corner of the screen.
2. Read the list of requirements, then click “ok.”
3. If you meet the requirements, complete the Homeport registry form. Required fields are indicated with an asterisk.
4. If you wish to receive USCG alerts by SMS/text messaging, check the box.
5. Select “primary Captain of the Port zone” from the drop-down menu.
6. To add one or more COTP zones, check the box or see “adding other COTP zones to the registration form.”
7. If applicable, select a value under “committees.” For the Safety Advisory Committee, enter your title, role, and associated subcommittee.

The tabs on Homeport currently available to guest users are:

- **Missions**—information about the U.S. Coast Guard’s efforts in marine safety, marine security, and environmental protection.
- **Port Directory**—public information directory for each U.S. Coast Guard port area.
- **Library**—U.S. Coast Guard marine safety, marine security, and environmental protection regulations, policy, forms, and publications.

Creating a personal user account on Homeport will increase available in-

formation. Recent updates to Homeport include a feature enhancement allowing users to customize content that will personalize the display content to include multiple ports, increasing the dissemination of area-specific information by port or interest. Users may also sign up for USCG text message alerts.

About the author:

ENS Amy Downton is assigned to the Office of Vessel Activities, Commercial Fishing Vessel Division. Previous experience includes marine safety, investigation, inspection, maritime law enforcement, and search and rescue operations. Prior to becoming an officer, she entered the Coast Guard in 2005 as a marine science tech.

Endnote:

¹ Title 46 Code of Federal Regulations, Part 28—Requirements for Commercial Fishing Industry Vessels.

www.fishsafe.info

A large segment of the commercial fishing industry community uses www.fishsafe.info to link directly into specific Homeport topic areas.

In addition, the website provides the fishing community a forum for interaction and access to training and educational resources, instructor listings, contact information, and industry connections.

Fishsafe.info also provides a medium for communication with Coast Guard headquarters personnel.

Commercial FISHING VESSEL



SAFETY



Saving Lives at Sea Through Advocacy

The Commercial Fishing Industry Vessel Safety Advisory Committee.

by MR. JONATHAN WENDLAND
U.S. Coast Guard Office of Vessel Activities

The U.S. fishing industry, which dates back to our earliest settlers, was recently estimated to contribute \$38.5 billion to the U.S. gross domestic product.¹ It is also arguably the most dangerous profession in the country. Mindful of the social and economic impact of this industry, the Coast Guard's Commercial Fishing Industry Vessel Safety Advisory Committee* (CFIVSAC) provides insight and advice to the Coast Guard on matters relating to safe operations, regulatory requirements, and policies affecting fishermen's lives at sea.

These recommendations include information regarding safety equipment, procedures, marine insurance, train-

ing, personal qualifications, navigation safety, vessel design, vessel construction, and vessel maintenance. The CFIVSAC may review regulatory proposals and make available to Congress any information, advice, and recommendations it is authorized to give the Coast Guard.

CFIVSAC

The Commercial Fishing Industry Vessel Safety Advisory Committee consists of 17 members who are appointed by the Secretary of the Department of Homeland Security from recommendations made by the Commandant of the Coast Guard. The membership

SPURRED BY GRIEF

The Commercial Fishing Industry Vessel Safety Advisory Committee came into being largely as a result of a 1985 vessel incident.

On August 20, 1985, the body of crewmember Peter Barry from the F/V *Western Sea* was found in the frigid waters near Kodiak, Alaska. Prior to this discovery, there was no indication that the vessel was in peril.¹ The son of Mr. Robert Barry, U.S. Ambassador to Bulgaria, Peter was on a summer break from college working in Alaska.

Twenty-one days after Peter's body was recovered, two more crewmembers were recovered—floating lifeless. Sadly, all were wearing Coast Guard-approved life jackets.

At that time, however, survival craft, immersion suits, and emergency position-indicating radio beacons were not required safety items for fishing vessels.

The ambassador immediately sought more information and answers to questions regarding his son's tragedy. When he learned that fishing vessels weren't mandated to carry that safety equipment, he began aggressively lobbying for fishing vessel safety regulations. On September 9, 1988, the Commercial Fishing Industry Vessel Safety Act, which contained the legal authority for the CFIVSAC, became law.

Endnote:
¹ USCG F/V *Western Sea* investigation March 31, 1986.



is organized as follows:

- 10 members represent the commercial fishing industry;
- 3 members are from the general public;
- 1 is a naval architect or marine surveyor;
- 1 is an equipment manufacturer;
- 1 is an education or training professional related to fish processor, fish tender, or fishing vessel safety;
- 1 is a vessel insurance underwriter.

A committee member is appointed to a three-year term, and can serve more than one term. The chief of the U.S. Coast Guard Office of Vessel Activities manages the committee and, in addition to other responsibilities, approves or calls its meetings and approves agendas.

USCG, CFIVSAC, and NMFS

To better understand the interagency relationships among the National Oceanic Atmospheric Administration (NOAA)'s National Marine Fisheries Service, the Commercial Fishing Industry Vessel Safety Advisory Committee, and the Coast Guard, it may help to know some fishery management history.

Fishery management in America commenced in earnest in the mid-1970s when the Fishery Conservation and Management Act of 1976 established today's fishery management councils. These councils have the authority to mandate fisheries management plans that support sustainable fisheries.

The Coast Guard is involved in fisheries management planning and enforcement, but does not have any voting authority on any fishery management council. Additionally, the CFIVSAC is not part of the fishery management councils, and so relies on its Coast Guard-designated representative to present CFIVSAC views

NEW DEADLIEST CATCH

The CFIVSAC held its 30th meeting in May 2010 in Oakland, Calif. During this meeting, the National Institute for Occupational Safety and Health (NIOSH) presented new data associated with fatality rates. The data presented by Dr. Jennifer Lincoln conveyed that the inherently dangerous fishing industry had a new (but perhaps not meant for television) "deadliest catch."

NIOSH data (2000–2009) shows that the Alaska Crab fishery was supplanted by the New England multi-species ground fishery as America's new "most deadly catch." See related article in this edition.

and recommendations to the councils.

CFIVSAC Efforts
The CFIVSAC has made hundreds of recommendations to the Coast Guard since its inaugural meeting in 1989. For example, recent data showed that in virtually all man-overboard fatalities over the last 10 years, none of the individuals was wearing a flotation device. As a result, the committee passed a recommendation to require fishing vessel crewmembers to wear a flotation device when working on deck outside the rails or when setting or hauling gear. The Coast Guard currently has a rulemaking project in progress to address this recommendation.

For more INFORMATION:

For more information on the USCG Fishing Vessel Safety Division and CFIVSAC go to <http://www.fishsafe.info>.

CFIVSAC recommendations and meeting minutes can be found at:

<https://homeport.uscg.mil/CFIVSACHistoricalRecommendations>

<https://homeport.uscg.mil/CFIVSACmeetingminutes>

Get in Touch

If you have any thoughts on improving fishing vessel safety, the Coast Guard encourages you to contact the Commercial Fishing Industry Vessel Safety Advisory Committee or the USCG Fishing Vessel Safety Division.

About the author:

Mr. Jonathan Wendland works at USCG headquarters in the Fishing Vessel Safety Division in the Office of Vessel Activities. Prior to his current position, he served as a NOAA Corps Officer, splitting time between Ocean Atmospheric Research (OAR) and the National Marine Fisheries Service. His background is in ocean engineering.

Champion's Note:

*The 2010 Coast Guard Authorization Act re-names the committee the "Commercial Fishing Safety Advisory Committee," adds an 18th member representing fishing communities and families, and extends the committee to 2020.

Endnote:

¹ NOAA Current Fishery Statistics No. 2009.

Bibliography:

46 U.S.C.
16 U.S.C.



Commercial FISHING VESSEL



Fishery-Specific Risk Factors

Using the public health approach to improve fishing vessel safety.

by MR. DEVIN LUCAS, MS
Statistician

National Institute for Occupational Safety and Health
Alaska Pacific Regional Office

CDR JENNIFER LINCOLN, PH.D., CSP
U.S. Public Health Service
Injury Epidemiologist

National Institute for Occupational Safety and Health

Although progress has been made to improve safety on commercial fishing vessels, commercial fishing continues to be the most dangerous occupation in the country. In 2008, commercial fishermen had a fatality rate nearly 36 times higher than the rate for all U.S. workers.¹ Broad interventions on a national level have had some success in reducing fatalities, but greater improvements will come from tailored programs targeted at specific hazards of various fleets.

The Public Health Approach

A proven and frequently used method for reducing injuries and illnesses in a variety of settings and circumstances is the “public health approach.” The National Institute for Occupational Safety and Health (NIOSH) has also referred to this approach as “the Alaska Model” when describing safety improvements among high-risk workers in Alaska. This approach seeks to benefit the largest number of people through a systematic, four-step process. Applied to the problem of fatal injuries in the fishing industry, the steps of the public health approach are:

- Define the problem through surveillance. Collect data about the magnitude, scope, characteristics, and consequences of fatal injuries. It is especially important in the fishing industry to gather data about a specific fishery, gear, and type of vessel.
- Establish why fatalities occur. Use scientific research and industry input to determine the causes and risk factors.

- With input from industry, design tailored interventions for specific fisheries and evaluate their effectiveness.
- Implement the interventions found to be most effective.

The value and importance of this approach was demonstrated in the Bering Sea and Aleutian Islands (BSAI) crab fishery.²

The Approach in Practice

Scientists at NIOSH conducted injury surveillance in the Alaska fishing industry during the 1990s. They discovered that the BSAI crab fishery had the highest fatality rate in the state, and that capsizing due to overloading was the leading cause of fatalities.

In 1999, the identification of this major safety problem prompted the local USCG office to work with industry to develop an intervention—the USCG Preseason Dockside Enforcement Program. This program focuses on the immediate hazard of vessel overloading and does not allow vessels to be overloaded with crab pots when they leave port.²

NIOSH evaluated the effectiveness of this program and found that since implementation, the average annual fatality rate for the BSAI crab fleet has decreased by 60 percent—from a high of 768 deaths per 100,000 fishermen during 1990-1999 to 305 deaths per 100,000 fishermen during 2000-2006.³ This success can be replicated in other fisheries across the country.

Step 1: Data collection

Historically, part of the difficulty in improving safety in the U.S. fishing industry has been with implementing this first step. There was a lack of data needed to properly identify hazards by region, fishery, and type of event. In 2007, NIOSH developed the Commercial Fishing Incident Database (CFID) to collect and analyze data on fatalities in the U.S. commercial fishing industry to identify high-risk fisheries (defined by species targeted, location of fishing grounds, time of year, and gear type) and to discover the patterns of risk factors that contribute to fatal events.

Every occupational fatality in the U.S. fishing industry is entered into the CFID each year. Currently, the database has detailed information about all commercial fish-

try to identify high-risk fisheries (defined by species targeted, location of fishing grounds, time of year, and gear type) and to discover the patterns of risk factors that contribute to fatal events.

THE STATISTICS

According to the NIOSH Commercial Fishing Incident Database, during 2000-2009, 504 commercial fishing fatalities occurred in the U.S., averaging 50 per year.

Most deaths (261, or 52 percent) occurred following a vessel disaster (including sinking, capsizing, fire) in which the crew was forced to abandon ship. Falls overboard accounted for 155 fatalities (31 percent). The remaining deaths were due to onboard injuries (51, or 10 percent), diving injuries (19, or 4 percent), and on-shore injuries (18, or 3 percent).

Vessel Disaster

The 261 fatalities that resulted from vessel disasters occurred in 148 separate vessel disaster incidents, and were generally the result of a sequence of events. The most frequent initiating events were flooding (37, or 28 percent), vessel instability (24, or 18 percent), and vessels struck by a large wave (23, or 18 percent). Severe weather conditions contributed to 61 percent of fatal vessel disasters.

Falls Overboard

Among the 155 victims who died from falling overboard, none wore a personal flotation device, and 53 percent of falls were not witnessed. The main causes of falls overboard were trips/slips (43, or 33 percent), losing balance (34, or 26 percent), and gear entanglement (21, or 16 percent).

Geographic Data

The fisheries and events that led to the highest number of fatalities included:

- falls overboard in the Gulf of Mexico shrimp fishery (29, or 6 percent of total U.S. fatalities),
- vessel disasters in the Northeast scallop fishery (27, or 5 percent),
- vessel disasters in the West Coast Dungeness crab fishery (21, or 4 percent),
- vessel disasters in the Northeast multi-species groundfish fishery (19, or 4 percent).

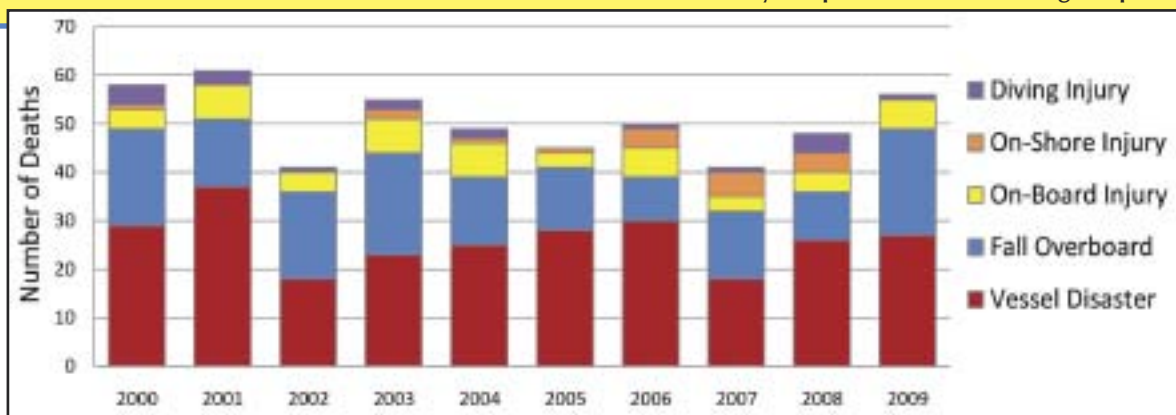
The 29 fatal falls overboard in the Gulf of Mexico shrimp fishery were largely caused by trips/slips (48 percent) and losing balance (24 percent). About half (48 percent) of these falls overboard were not witnessed.

Initiating Events

The main initiating events for the nine vessel disasters (leading to 27 fatalities) in the Northeast scallop fishery were vessel instability (25 percent), collisions (25 percent), and snagging gear on the ocean floor (25 percent).

In the West Coast Dungeness crab fishery, the main initiating events for the 10 vessel disasters (leading to 21 fatalities) were crossing a river bar (40 percent), vessel instability (30 percent), and vessels struck by a large wave (20 percent). Severe weather was associated with all vessel disaster incidents in this fishery.

Finally, in the Northeast multi-species groundfish fishery, the main initiating events for the 12 vessel disasters (19 fatalities) were instability (50 percent) and flooding (40 percent).



U.S. fishing fatalities by year and incident type, 2000-2009 (504 total), "Commercial Fishing Deaths—United States, 2000-2009." MMWR 2010; Vol. 59, No. 27.

ing fatalities in the country during 2000-2009. The information comes from multiple sources including USCG investigation reports, local law enforcement reports, news media, and death certificates. The CFID includes information regarding the vessel characteristics, environmental factors, and victim demographic data for each incident.

Step 2: Identify risk factors

With 10 years of robust fatality data available for the country, NIOSH recently moved forward to the second step of the public health approach—data analysis to identify the causes and risk factors for fatalities in hazardous fisheries. The results can be used to design tailored interventions that address the primary risk factors in specific fisheries.

Steps 3 and 4: Develop, evaluate, and implement tailored interventions

To be most effective, interventions should focus on the fisheries and incident types accounting for the highest number of fatalities.

For example, shrimp fishermen falling overboard in the Gulf of Mexico led to the highest number of fishery-specific fatalities in the country during 2000-2009 (see sidebar). Since none of these fishermen wore a personal flotation device (PFD), identifying and understanding the barriers to PFD usage is necessary. In addition, many of these events were caused by trips/slips and losing balance, and almost half were not witnessed. Fishermen need to be able to alert others when they fall overboard or be able to stop the engine and re-enter the vessel if they are fishing alone.

In the Northeast scallop fleet, preventing the hazards leading to vessel instability, collisions, and snagging gear on the ocean floor is necessary. A previous study on the scallop fleet in Maine reported a distinct pattern of serious injuries and capsizings in the mid-1990s while towing fishing apparatus across the sea bed or while lifting laden fishing apparatus from the water to recover the catch.⁴ USCG personnel then engaged the fishermen in town hall meetings to discuss the hazards and potential solutions. This type of an approach could be repeated for the entire Northeast scallop fleet, and an evaluation could be done for its effectiveness.

The causes of vessel disasters in the West Coast Dungeness crab fishery are different from those in the Northeast scallop fishery, and so require interventions tailored to the problem. In 2008 NIOSH published a report outlining the hazards in the West Coast Dungeness crab fishery and recommended continuing the preseason

safety inspections in place for this fleet, as well as improved weather reporting, addressing the hazards of river bars, marine safety training, and encouraging fishermen to wear PFDs.

Since the report was published, the USCG has implemented stricter guidelines for all vessels crossing hazardous bars, legislatures have sought better infrastructure for marine forecasting, and the Oregon Dungeness Crab Commission has encouraged fleet participation in safety training programs by offering incentives for members to attend. The commission has also sponsored a rebate program to help fishermen purchase PFDs. These types of targeted efforts and others should continue and should be evaluated for their effectiveness.

Conclusion

Every fishery has unique risk factors, and interventions must be tailored to each fishery to be effective. Interventions should be evaluated to measure their effectiveness. Once a safety intervention has been pilot tested and found to be effective, it should be expanded to cover other vessels that experience similar risk factors and become a permanent safety improvement.

More work is needed to develop and implement interventions in fisheries across the country. NIOSH will continue to collect and analyze data in the CFID and provide detailed information on fishery-specific hazards. Organizations, agencies, and other groups located near the fishery can use the information to create practical, industry-supported solutions.

About the authors:

Mr. Devin Lucas is a statistician with NIOSH at the Alaska Pacific Regional Office. He conducts research on occupational safety in the fishing industry across the U.S. The results of his research have appeared in scientific journals and industry publications.

CDR Jennifer Lincoln, Ph.D., CSP, is an injury epidemiologist and leads the NIOSH Commercial Fishing Safety Research and Design Program. Dr. Lincoln is a strong advocate of providing science to improve safety in the workplace and specializes in commercial fishing safety research.

Endnotes:

- ¹ U.S. Department of Labor, Bureau of Labor Statistics, Injuries, Illnesses and Fatalities: Census of Fatal Occupational Injuries (CFOI)—current and revised data. Washington, DC: U.S. Department of Labor, Bureau of Labor Statistics; 2010. Available at <http://www.bls.gov/iif/oshcfoi1.htm>.
- ² C.J. Woodley, J.M. Lincoln, and C.J. Medlicott, "Improving Commercial Fishing Vessel Safety through Collaboration," *Proceedings of the Marine Safety and Security Council, the Coast Guard Journal of Safety and Security at Sea*, Spring 2009, p. 38-44.
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- ⁴ J. Ciampa, V. Wilczynski, T.J. Smith, and A.S. Backus, "An Innovative Investigation of the Relationship between Fisheries Equipment Design and Marine and Occupational Accidents in the Inshore Scallop Fishery of the Northeastern United States." In: *Proceedings of the International Fishing Industry Safety and Health Conference*. Woods Hole, MA: October 23-25, 2000. Cincinnati, OH: U.S. Department of Health and Human Services, CDC, National Institute for Occupational Safety and Health. NIOSH publication no. 2003-102.

The Coast Guard and Third-Party Organizations

Industry professionals working together to improve fishing vessel safety.

by MR. DAVID BELLIVEAU
U.S. Coast Guard Fishing Vessel Safety Division

The Commercial Fishing Industry Vessel Safety Act of 1988 and the subsequent requirements for commercial fishing industry vessels in 46 CFR Part 28 were intended to reduce commercial fishing vessel losses and fatalities.

To help fishermen understand the regulations and requirements for their vessels, the Coast Guard instituted a dockside safety examination program in 1991. Safety examinations are generally conducted by Coast Guard active duty, reserve, auxiliary, or civilian personnel at no cost to the fishermen. These examinations are voluntary and “no-fault.” This means that if during the course of an examination a discrepancy is found—say a couple of missing fire extinguishers—there will be no violation written for the discrepancy. The discrepancy will be noted on the commercial fishing vessel safety examination form, no safety decal will be issued, and the owner/operator/master will be informed that until the discrepancies are corrected no decal will be issued.

The voluntary dockside safety exam is not considered a law enforcement boarding, *per se*. If an extremely hazardous condition is found that would put the lives of the crew or the safety of the vessel at risk, then the fishing vessel examiner may bring that condition to the attention of the cognizant captain of the port (COTP). The

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COTP can then decide if enforcement action needs to take place, e.g. detaining a vessel in port. Upon successful completion of a dockside examination, a vessel is issued an examination decal.

Low Participation

Since the program’s inception, the Coast Guard has conducted an average of 7,000 dockside safety examinations and issued approximately 3,000 decals per year. Unfortunately, that represents less than 10 percent of commercial fishing vessels.

In an effort to increase outreach and make safety examinations more readily available to the commercial fishing industry, these examinations may also be conducted by approved members of a “third-party” organization.¹ However, there will normally be a cost incurred when the examination is conducted by a third-party examiner.

Third-Party Examination Program

The Coast Guard’s third-party examination program utilizes the established corps of surveying professionals in the maritime industry as a supplement to the Coast Guard’s own uninspected fishing industry vessel boarding and examination program. Owners of commercial fishing industry vessels can benefit by having



experienced, professional surveyors assisting them in complying with the regulations. This, in turn, helps improve fishing vessel safety by increasing the total number of vessels examined annually.

An organization desiring to be designated as an accepted organization or similarly qualified organization must request such designation in writing from the U.S. Coast Guard Fishing Vessel Safety Division. Navigation and Vessel Inspection Circular 13-91 provides guidance.

About the author:

Mr. Belliveau currently works at USCG headquarters in the Office of Vessel Activities, Commercial Fishing Vessel Safety Division. He is a graduate of Massachusetts Maritime Academy, has sailed as a licensed merchant marine officer, and served in the Coast Guard on active duty for over 20 years.

Endnote:

¹ Precedent for use of third-party examiners can be found in 46 CFR 28.700. 46 CFR 28.700 stipulates that each fish processing vessel that is not subject to inspection must be examined biennially. Examinations are to be performed by the American Bureau of Shipping, a “similarly qualified organization,” or a surveyor of an “accepted organization.” These vessels, when examined and found to be in compliance with 46 CFR Chapter I, are issued a certification of compliance in accordance with 46 CFR 28.710(c). Additionally, the third-party examiner may issue any fishing vessel the CFVS examination decal.

For more INFORMATION:

For more information on third-party examiners or on how to qualify as a similarly qualified or accepted organization, visit the USCG commercial fishing vessel site at www.fishsafe.info.

Navigation and Vessel Inspection Circular 13-91
<http://www.uscg.mil/hq/cg5/nvic/pdf/1991/n13-91.pdf>



USCG Auxiliary Commercial Fishing Vessel Examiners

*America's volunteer
guardians aid
prevention efforts.*

by MR. MATTHEW HOOPER

Marine Safety Transportation Specialist

U.S. Coast Guard Office of Vessel Activities, Fishing Vessel Safety Division

Working in the highest-risk industry for fatalities and serious injury, fishermen rely on their vessels and equipment to allow them to provide a living for themselves and their families. By helping to ensure fishermen operate seaworthy vessels, have the proper lifesaving equipment on board, and are familiar with how to use it, the Coast Guard can help save lives in this dangerous industry.

However, with nearly 80,000 commercial fishing vessels nationwide, it becomes very difficult for the Coast Guard to conduct vessel safety exams and life-saving training. This is where the U.S. Coast Guard Auxiliary comes in.

Commercial Fishing Vessel Safety Exams

The Coast Guard Auxiliary was established by Congress in 1939 and today is comprised of nearly 30,000 members. These men and women volunteer more than two million hours annually, performing a vast array of missions including vessel safety checks, harbor patrols, search and rescue, marine environmental protection, and commercial fishing vessel safety exams. Working alongside civilian, active duty, and reserve personnel, auxiliaries perform hundreds of commercial fishing vessel safety exams annually. Nationwide, approximately 25 percent of all exams are performed by auxiliary examiners.

Prospective examiners may attend a week-long training course, must complete a "personal qualification standard," and pass an oral and practical examination

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WHAT'S IN IT FOR ME?

Aside from the peace of mind provided by earning a USCG commercial fishing vessel safety decal, showing compliance with vessel requirements, it benefits the fisherman by reducing the time involved in an at-sea Coast Guard fisheries enforcement boarding. It may also decrease premium rates on vessel insurance, saving the operator both time and money.

to demonstrate the appropriate knowledge. Once qualified, auxiliary commercial fishing vessel examiners join the ranks of those who work diligently to improve fishing vessel safety.

—For more INFORMATION:

For more information on the Coast Guard's Commercial Fishing Vessel Safety Program or on becoming a member of the Coast Guard Auxiliary visit www.FishSafe.info and www.cgaux.org.

About the author:

Mr. Hooper is currently a marine safety transportation specialist in the U.S. Coast Guard Office of Vessel Activities Fishing Vessel Safety Division. Prior to this position, he worked as a USCG marine science technician in Miami, Fla. For the last two years he has worked under the D7 CFVS coordinator as well as the Sector Miami Chief of Uninspected Vessels, conducting over 150 commercial fishing vessel exams and acting as a training liaison for the USCG Auxiliary.



Commercial FISHING VESSEL



Health and Safety at Sea

OSHA's authority over commercial fishing industry vessels.

by LCDR MICHELE BOUZIANE
Attorney, U.S. Coast Guard Office of General Law

The Occupational Safety and Health Administration (OSHA) has rules that apply to commercial vessels, including uninspected fishing industry vessels. Its authority to regulate workplace safety on uninspected vessels was upheld and effected by a United States Supreme Court decision,¹ and the most current information with respect to OSHA authority over persons working on vessels on U.S. navigable waters can be found in OSHA's Compliance Directive, CPL 02-01-047.²

The directive provides information concerning OSHA's authority over persons working on vessels (inspected vessels, uninspected vessels, and commercial uninspected fishing industry vessels) and facilities on or adjacent to U.S. navigable waters and the outer continental shelf intended for OSHA national, regional, and area offices; industry parties; OSHA state programs; and federal agencies.

Jurisdiction

The authority of OSHA is limited to employment performed within the geographical limits covered by the Occupational Safety and Health Act of 1970.³ The act applies to employment performed in a state of the United States, the District of Columbia, Puerto Rico, the Virgin Islands, American Samoa, Guam, the Northern Mariana Islands, Wake Island, Johnston Island, and outer continental shelf lands. "State" includes all U.S. navigable waters within the state.

For coastal states, the state territorial seas extend three nautical miles seaward from the general coastline, ex-

cept for the Gulf Coast of Florida, Texas, and Puerto Rico, where the state territorial seas extend for nine nautical miles.

Authority Over Commercial Uninspected Fishing Industry Vessels

Commercial uninspected fishing industry vessels are fish processors 5,000 gross tons and less, fish tenders 500 gross tons and less, and all fishing vessels (see definitions sidebar). Authority over working conditions on commercial uninspected fishing industry vessels is shared by the U.S. Coast Guard and OSHA, with the U.S. Coast Guard as the lead agency.⁴

These vessels are also subject to the general regulations for uninspected vessels in 46 CFR Parts 24, 25, and 26.⁵ Uninspected vessels are vessels that are not required by law to be inspected (vessels subject to inspection are listed in 46 U.S.C. 3301) and are not recreational vessels.⁶ Encompassed within the category of uninspected vessels are all commercial fishing vessels, towing vessels,⁷ and six-passenger vessels.

OSHA will continue to exercise its authority and issue citations to the owners, charterers, managing operators, or agents in charge of commercial uninspected fishing industry vessels for working conditions that are not specifically covered by U.S. Coast Guard regulations within the jurisdictional limits, for the protection of all employees, including seamen.⁸

Factory production operations (fish processing) and associated equipment operations, including cleaning, maintenance, and repair, are exclusively covered by 29 CFR Part 1910 general industry standards. Repairs and maintenance to structural components of the vessel and mechanical, electrical, and other systems that are not directly associated with the factory production operations are covered by 29 CFR Part 1915 shipyard employment standards. Such repairs and maintenance covered by 29 CFR Part 1915 would include repairs and maintenance of bulkheads, decks, and overheads of the factory area; and any systems in the factory area that are not related to the factory production operations and not covered by U.S. Coast Guard regulations.

For uninspected vessels and commercial uninspected fishing industry vessels, OSHA standards are applicable to the working conditions of all workers, including crewmembers, as detailed in the instruction.⁹

About the author:

LCDR Michele Bouziane is an attorney currently working in the Coast Guard Office of General Law. She spent the previous two years in the Coast Guard Office of Legislation. A polyglot (speaking French, Spanish, and Portuguese), she was the Coast Guard's Foreign Language program manager from 2005-2008.

Endnotes:

- ¹ Chao v. Mallard Bay Drilling, Inc., 534 U.S. 235 (2002).
- ² CPL 02-01-047, which became effective on February 22, 2010, can be viewed or downloaded in its entirety at www.osha.gov.
- ³ 29 U.S.C. 653(a).
- ⁴ OSHA is precluded under section 4(b)(1) of the OSH Act from enforcing requirements pertaining to working conditions regulated by another federal agency. Applicable U.S. Coast Guard regulations in force that preempt OSHA for commercial uninspected fishing industry vessels are set forth in 46 CFR Part 28, and are summarized in Appendix B of the instruction.
- ⁵ See also Appendix C, Applicable U.S. Coast Guard Regulations for Uninspected Vessels.
- ⁶ 46 U.S.C. 2101(43).
- ⁷ Effective August 9, 2004, towing vessels were added to the list of vessels in 46 U.S.C. 3301 subject to inspection (i.e., inspected vessels). Thus, the U.S. Coast Guard has the authority to prescribe and enforce regulations for all towing vessels. However, until the U.S. Coast Guard has inspected vessel safety and health regulations in place for towing vessels in general, towing vessels continue to be classified as uninspected vessels; except for steam powered towing vessels and tugboats, and seagoing towing vessels and tugboats that are 300 gross tons or more, which are classified as inspected vessels. Thus OSHA will continue to provide safety and health coverage of employees on uninspected towing vessels until the U.S. Coast Guard issues inspected vessel regulations for these vessels.
- ⁸ A list of the most common enforceable OSHA requirements for commercial uninspected fishing industry vessels is provided in the instruction's Appendix A. When OSHA has safety and health coverage over working conditions of employees on vessels and facilities on or adjacent to U.S. navigable waters and the OCS, the following OSHA standards apply: 29 CFR Part 1910 for general working conditions not otherwise regulated, such as the working conditions on uninspected vessels that are not addressed by U.S. Coast Guard regulations; and Section 5(a)(1), the general duty clause of the Occupational Safety and Health Act (OSH Act), for recognized hazardous situations that are causing or are likely to cause death or serious physical harm to the employees of the employer to be cited, for which there are no specific OSHA standards or U.S. Coast Guard regulations.
- ⁹ CPL 02-01-047. Also see Appendix A and Appendix C to the instruction.

Commercial Fishing Industry Vessel: A fishing vessel, fish tender vessel, or a fish processing vessel per 46 CFR 28.50.

Fish: Finfish, mollusks, crustaceans, and all other forms of marine animal and plant life except marine mammals and birds per 46 U.S.C. 2101(11).

Fish Processing Vessel: A vessel that commercially prepares fish or fish products other than by gutting, decapitating, gilling, skinning, shucking, icing, freezing, or brine chilling per 46 U.S.C. 2101(11b).

Fish Processing: As defined by OSHA, fish processing is a production function that involves any preparation of a fish or fish product by a worker including: gutting, decapitating, gilling, skinning, shucking, icing, freezing, or brine chilling. It is important to recognize that the definition of fish processing used by OSHA, based on North American Industry Classification System Code 31171 (Seafood Product

Preparation and Packaging), is predicated on worker function, and therefore may occur on vessels other than a U.S. Coast Guard-classi-

fied fish processing vessel (such as a fish tender vessel or fishing vessel).

Fish Tender Vessel: A vessel that commercially supplies, stores, refrigerates, or transports fish, fish products, or materials directly related to fishing or the preparation of fish to or from a fishing vessel, fish tender vessel, fish processing vessel, or a fish processing facility per 46 U.S.C. 2101(11c).

Fishing Vessel: A U.S. Coast Guard classification for a vessel that commercially engages in the catching, taking, or harvesting of fish or an activity that can reasonably be expected to result in the catching, taking, or harvesting of fish per 46 U.S.C. 2101(11a).

U.S. Navigable Waters: Includes territorial seas of the U.S. and U.S. internal waters (i.e., all rivers, tributaries, lakes, bays, and sounds shoreward of the territorial sea baseline) that: 1) are subject to tidal influence; or 2) are, have been, or are susceptible for use, by themselves or in connection with other waters, for substantial interstate or foreign commerce per 33 CFR Part 2.

Seaman: An individual engaged or employed in any capacity aboard a vessel in navigation, and who has a substantial connection with a vessel or fleet of vessels, and who contributes to the function of the vessel or to the accomplishment of its mission.¹

Uninspected Vessel: A vessel not subject to inspection under 46 U.S.C. 3301 and not a recreational vessel per 46 U.S.C. 2101(43). A vessel classified as an uninspected vessel by the U.S. Coast Guard is subject to limited U.S. Coast Guard inspection of the following areas: basic firefighting equipment, approved life jackets and lifesaving equipment, ventilation of engine bilges and fuel tank compartments, and back-fire traps/flame arresters on inboard engine carburetors using gasoline as a fuel. Commercial uninspected fishing industry vessels must comply with U.S. Coast Guard regulations in these areas, as well as a number of others.²

Endnotes:

- ¹ A vessel in navigation is one which is on a voyage or which is at anchor, berthed, or dockside, but not one which is undergoing a major overhaul or renovation. The connection to the vessel or vessels must be substantial in terms of both its duration (30 percent or more of the seaman's time) and its nature. [See the U.S. Supreme Court decision in *Chandris, Inc. v. Latsis*, 515 U.S. 347 (1995).]
- ² 46 U.S.C. 4502.



Commercial FISHING VESSEL



SAFETY

The Alternate Compliance and Safety Agreement

*A model program with
the ability to evolve.*

by Mr. TROY RENTZ
ACSA Coordinator
U.S. Coast Guard Thirteenth District

The Bering Sea/Aleutian Island and Gulf of Alaska freezer longliner and freezer trawler fleet, referred to as the “head and gut” (H&G) fleet, occupies a unique niche in the North Pacific fishing industry. Unlike other catcher vessels that deliver fish to shore plants, H&G vessels catch, sort, head, eviscerate, clean, and prepare fish into various fish products aboard the vessel. These products are then frozen, packaged, and stored on the vessel until they are offloaded.

Before 2006, vessels in the H&G fleet were regulated as fishing vessels as opposed to “fish processing vessels.” Following several marine casualties within this fleet,¹ marine casualty investigations determined that H&G vessels should be classified as fish processing vessels and be subject to the requirements of that classification.

The Alternate Compliance and Safety Agreement

Due to age restrictions imposed by classification societies, however, nearly 70 percent of the H&G fleet



The ACSA 2010 stakeholders meeting. USCG photo by Mr. Dan Hardin.



Vessel hull thickness is evaluated during an Alternate Compliance and Safety Agreement dry-dock examination. The examinations are conducted twice in every five-year period. USCG photo by Mr. Mike Rudolph.

would not be accepted for classification.² The Alternate Compliance and Safety Agreement (ACSA) program, which allows exemptions to class and load line requirements, was developed as an alternative.

To enroll in the program, operators agree to comply with appropriate safety standards to improve watertight integrity, vessel stability, fire prevention, machinery maintenance, lifesaving equipment, and crewmember training. Safety standards for the program are developed by the Coast Guard collaboratively with vessel owners, operators, and vessel associations.

Safety Measures

ACSA takes a regional approach to adopting safety measures, evaluating strategies to prevent fatalities and vessel losses based on specific risks within the head and gut fleet and the remote cold water environment in which they operate. Examples of ACSA safety measures:

- dry-dock examinations to verify the condition of the hull, watertight closures, critical systems, and internal structure;
- watertight integrity plans containing specific instructions for all watertight closures, high-water alarms, and vents;
- at-sea watches must verify the status watertight closures;
- additional trained drill conductors;
- additional training for fire teams;
- safety videos and training programs in the language of the crew;
- life rafts³ must be capable of being launched by a single person;

- embarkation ladders for survival craft;
- immersion suit lights must be strobe type;
- engine room fire detection systems are required;
- communications must be available between the wheelhouse and CO₂ discharge station.

Currently there are more than 50 vessels enrolled in the Alternate Compliance and Safety Agreement program. All vessels enrolled in the program complete examinations for compliance with ACSA safety standards

each year and complete dry-dock examinations twice in each five-year period. In the past year, 439 safety discrepancies were identified and corrected.

Lessons learned from shortfalls in initial implementation of the program have called for re-examination of the program to ensure risks are identified and addressed. A major advantage of the ACSA program is



The internal structure, including the tanks and void spaces of an Alternate Compliance and Safety Agreement vessel, is examined by a USCG examiner. USCG photo by Mr. Mike Rudolph.

the ability to evolve, taking into account lessons learned. The Coast Guard will continue to exercise an aggressive leadership role in this program while con-



Recovering an individual from the water during a drill. USCG photo by Mr. Mike Rudolph.

sulting with the H&G fleet stakeholders to honor their significant commitment to date.

The Alternate Compliance and Safety Agreement has been recognized by lawmakers as a model alternate compliance program. Similar programs tailored to regional fisheries and their specific risks have been recently authorized.

About the author:

Mr. Troy Rentz is a Coast Guard veteran with a diverse background in vessel inspections and marine casualty investigations. He serves as the Coast Guard Thirteenth District ACSA coordinator.

Endnotes:

- ¹ "Crisis in the Bering Sea. The fire and explosion aboard a fish processor." *Proceedings of the Marine Safety & Security Council*, Summer 2006, p. 45. "No Survivors. A fishing vessel meets a mysterious end in the Bering Sea." *Proceedings of the Marine Safety & Security Council*, Summer 2010, p. 81.
- ² The regulations in 46 CFR 28.720 do not provide an alternative for the operator of a fish processing vessel that cannot be classed; however, under 46 CFR 28.60, such a vessel may request an exemption letter.
- ³ All life rafts must meet SOLAS standards, USCG Approval 160.151, which include improved design, construction, testing, and features such as larger ballast bags and boarding ramps. The date for full implementation is January 1, 2011.

— For more INFORMATION:
 For more information go to
[www.fishsafe.info.](http://www.fishsafe.info)

**RELATIVE COMPARISON OF
 LOAD LINE AND ACSA
 REQUIREMENTS**

by MR. TOM JORDAN

*U.S. Coast Guard Office of Design
 and Engineering Standards
 Naval Architecture Division*

The purpose of load line assignment is to ensure the seaworthiness of an intact (undamaged) vessel. This is accomplished by:

- **Ensuring a robust hull that can withstand severe sea conditions** (i.e. structural design, construction, and maintenance)
- **Ensuring weathertight and watertight integrity** (i.e. coamings; exposed doors, hatches, hull valves, etc., are in good working condition)
- **Ensuring that the vessel has reserve buoyancy and is not overloaded** (by limiting the maximum loaded draft)
- **Ensuring that the vessel has adequate stability for all loading and operating conditions** (by approved stability documentation and instructions)
- **Ensuring rapid drainage of boarding seas** (by adequate arrangement of freeing ports in bulwarks)
- **Ensuring safety of crew while working on deck** (by increased freeboard to reduce boarding seas, guardrails)
- **Ensuring that modifications to vessel do not compromise seaworthiness** (modifications must be approved by LL assigning authority)
- **Periodic third-party inspections (afloat and drydocked) to verify that the above measures are properly maintained** (by authorized class society)

Each of these seaworthiness elements are compared with the equivalent ACSA requirement.



Seaworthiness Element	Load Line Requirements	ACSA Requirements
Strength of hull	<ul style="list-style-type: none"> • Designed and constructed in accordance with ABS rules for ocean service • Maintained in accordance with ABS structural requirements and corrosion limits • Drydocked every five years for inspection • Audiogauging of hull (plating and stiffeners) as required by ABS. Extent of gaugings increases as vessel ages (especially after 15 years). 	<ul style="list-style-type: none"> • Many ACSA vessels were not originally built to ABS standards. However, the robustness of their hull construction has been demonstrated by years of service. The objective, therefore, is to preserve their inherent robustness. • Must undergo hull and structural gauging as part of ACSA enrollment. Excessively corroded members (i.e., more than 25% loss) must be replaced unless calculations show that remaining thickness exceeds ABS minimum standards. • Similar to ABS standards • Drydocked twice in five years (not more than three years between drydockings) • Similar to ABS standards
Weathertight integrity <i>(coamings, exposed doors, hatches, vent covers, etc.)</i>	<ul style="list-style-type: none"> • Critical vents, air pipes, doorways protected by coamings (6" to 24" high, depending on location) • Documented list of closures • Inspected annually 	<ul style="list-style-type: none"> • 24-inch coamings required on main deck doors located in aft 1/3 of vessel; other existing coamings may have to be increased • Documented list of closures • Inspected annually
Watertight integrity of hull penetrations <i>(valves and associated piping systems)</i>	<ul style="list-style-type: none"> • Documented list of penetrations • Inspected during drydockings (i.e., every five years) 	<ul style="list-style-type: none"> • Documented list of penetrations • Inspected every other drydocking (i.e., every five years)
Reserve buoyancy and prevention of overloading	<ul style="list-style-type: none"> • Draft limit determined by freeboard assignment or stability calculations (whichever is more severe) • Limiting draft marked on hull with midship load line marks 	<ul style="list-style-type: none"> • Draft limited by stability calculation • Maximum draft marked on hull with special midship marks
Stability	<ul style="list-style-type: none"> • Must meet appropriate stability criteria • Easy-to-use stability and loading instructions must be provided for master • Must have valid stability documentation • Stability is reassessed only if modifications result in significant weight changes 	<ul style="list-style-type: none"> • Must meet appropriate stability criteria • Easy-to-use stability and loading instructions must be provided for master • Must have valid stability documentation • Must have been inclined within previous five years of ACSA enrollment • Stability must be reassessed every five years (must be re-inclined unless a dead-weight survey confirms that no weight changes have occurred)



Seaworthiness Element	Load Line Requirements	ACSA Requirements
Rapid drainage of boarding seas	<ul style="list-style-type: none"> Bulwarks must have adequate arrangement of freeing ports (specific requirements regarding location, size) 	<ul style="list-style-type: none"> Existing freeing ports might have to be upsized (must be sufficient to allow rapid clearing of water in all probable conditions of list and trim)
Protection of crew while working on deck <i>(increased freeboard, guardrails)</i>	<ul style="list-style-type: none"> Manned vessels assigned more freeboard than unmanned vessels Guardrails required around periphery of all decks and other critical walkways (must meet specific design and construction requirements) 	<ul style="list-style-type: none"> Existing guardrail arrangements may have to be improved
Control	<ul style="list-style-type: none"> Modifications that affect seaworthiness or freeboard assignment must be reviewed and approved by the load line assigning authority 	<ul style="list-style-type: none"> Modifications that affect stability, closures, hull penetrations, and factory sump pumping system must be approved by naval architect and brought to attention of USCG inspector Copies of stability instructions and inclining/deadweight surveys are to be submitted to local USCG
Periodic inspections	<ul style="list-style-type: none"> Annual inspections: <ul style="list-style-type: none"> Protection of openings (weather-tight closures) Guardrails Freeing ports Means of access to crew quarters Verification that no modifications have been made that invalidate load line assignment Drydock inspections: <ul style="list-style-type: none"> Hull and deck plating (gauged as required) Internal structure (gauged as required) Hull penetrations (valves, sea chests, discharges, etc.) Inspections conducted by surveyors of load line-assigning authority 	<ul style="list-style-type: none"> Annual inspections: Same as load line inspections Drydock inspections: Same as load line inspections Annual and drydock inspections conducted by USCG inspectors/examiners

The North Pacific Fishing Vessel Owners' Association Vessel Safety Program

Commercial
FISHING VESSEL



SAFETY

*Twenty-five years of
improving safety
through training.*

by Ms. LESLIE J. HUGHES
*Director of Government and Industry Affairs
North Pacific Fishing Vessel Owners' Association Vessel Safety Program*

By the mid-1980s the commercial fishing industry was widely recognized for its high casualty rate. Faced with the prospect of controls designed by those outside the fishing industry, as well as concerns about the cost and availability of insurance, the North Pacific Fishing Vessel Owners' Association (NPFVOA) developed a voluntary safety training program.

Recognizing the importance of vessel safety standards and crew safety awareness and training, but lacking the authority to regulate the commercial fishing industry, the U.S. Coast Guard was also beginning to develop a unique voluntary safety program in 1984. When the Coast Guard learned that the NPFVOA had already embarked upon a safety program for its fishermen, it joined those efforts in 1985. This union produced a set of comprehensive voluntary standards aimed at vessel safety, personnel safety, operational safety awareness, and education.

Now celebrating its 25th anniversary, the NPFVOA vessel safety program is a model safety training program that offers hands-on safety training and addresses Coast Guard regulations as well as a multitude of other safety concerns for the fishing industry.



During NPFVOA vessel safety training, students work as a team to control flooding in damage control classes. All photos courtesy of NPFVOA.

The Vessel Safety Program

The North Pacific Fishing Vessel Owners' Association vessel safety program is unique in that it is entirely self-





Intense fires in a vessel simulator provide students hands-on practice in firefighting.

supporting through member dues, course tuition, and the sale of educational materials. It is governed by a board of directors, and an executive director and staff plan and manage day-to-day operations.

Vital to NPFVOA's success is its membership base, which spans the range of industry from single-operator fishing boats to the largest processing ships with crews of 150 or more, and includes support businesses and individuals. This diverse membership base facilitates early identification of safety issues and concerns and allows broad and rapid dissemination of safety information.

Vessel Safety Manual

The vessel safety manual, originally prepared in conjunction with the U.S. Coast Guard, was first published in 1986. NPFVOA has updated it five times since then, with significant revisions following the Fishing Vessel Safety Act of 1988, subsequent regulations, and Coast Guard interpretations. The most recent edition was published in 2004.

The manual provides useful and practical measures that address a wide range of situations gleaned from those who have fished in the Bering Sea and North Pacific Ocean. It is not a set of legal documents, nor is it intended to be a rigid set of standards. Each vessel owner and captain should adopt his own safety practices based upon the specific characteristics of his vessel and gear type, the season and area of operation, and crew experience.

Crew Safety Training Program

Since 1985, the North Pacific Fishing Vessel Owners' Association has provided Coast Guard-approved safety training classes to nearly 40,000 mariners. Using hands-on practice to dramatize and enliven the informa-



Crews practice cold water survival techniques using lifesaving equipment.

tion, the crew safety training program offers both shipboard and classroom exercises.

Instructors who are experts in their respective fields provide training including:

- Standards of Training, Certification and Watch-keeping (STCW) basic safety training, including personal survival techniques (12 hours), personal safety and social responsibilities (4 hours), fire-fighting (16 hours), and first aid/CPR (8 hours);
- STCW basic safety training refresher course (24 hours);
- STCW medical care provider (32 hours);
- STCW medical person in charge (40 hours);
- emergency drill instructor workshop (8 hours);
- drill instructor for small boat operators (8 hours);
- onboard drill safety orientation (8 hours);
- proficiency in survival craft (limited) (16 hours);
- HAZWOPER (24 hours and 8-hour refresher);
- shipboard damage control (8 hours);
- shipboard watertight door and hatch maintenance (4.5 hours);
- OSHA compliance workshop (8 hours).

The classes emphasize teamwork and hands-on practice managing emergencies. The instruction often provides fishermen their first in-the-water experiences wearing immersion suits, as well as deploying, boarding, and righting life rafts. Many owners and captains

require training for new hires and refresher training for returning crew.

For more INFORMATION:

Situated in Fishermen's Terminal in Seattle, the North Pacific Fishing Vessel Owners' Association is easily accessible to the fishing vessel fleet that provides about half of the nation's seafood harvest.

For more information, contact the North Pacific Fishing Vessel Owners' Association at:

North Pacific Fishing Vessel Owners' Association
 1900 West Emerson, Suite 101
 Seattle, WA 98119
 206-285-3383
 Fax: 206-286-9332
 info@npfvoa.org
 www.npfvoa.org

"Safety and Survival at Sea" Series

The "Safety and Survival at Sea" videotapes/DVDs are designed to complement hands-on training classes for:

- medical emergencies at sea,
- safety equipment and survival procedures,
- fire prevention and control,
- fishing vessel stability.

All but the stability DVD are also available in Spanish.





Students learn to give each other injections in STCW medical care provider classes.



Students practice helping an injured crewmember into a life raft in the STCW personal survival techniques class.

Future Direction

NPFVOA plans to build upon the successes of the last 25 years and continue to expand course offerings and educational tools so the industry can continue to improve safety practices.

About the author:

Ms. Hughes was the executive director of the NPFVOA vessel safety program until 2008, when she became the director of industry and government affairs. She has been actively involved with the commercial fishing industry for more than 35 years and currently serves on the Coast Guard's Commercial Fishing Industry Vessel Safety Advisory Committee. She has received two Coast Guard meritorious public service awards for promoting safety for commercial fishermen.



Students set off distress signals in the drill instructor workshop class.

Upcoming in

Spring 2011

➡ **Waterways Management**

Summer 2011

➡ **The Marine Transportation System**

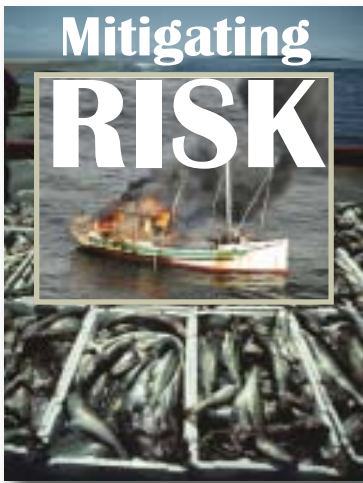
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Fish Safe!

Inspiring safety through collaboration.

by Ms. GINA JOHANSEN
*Program Manager
 Fish Safe BC*

In 1975 during the herring season in British Columbia (BC), Canada, 14 vessels capsized and 12 men were lost. Since then, regulatory agencies have scrambled to develop curriculums around fishing vessel safety, and the federal government created regulatory requirements for stability on fishing vessels and vessel master training. The Provincial Compensation Board (WorkSafeBC) created regulations for safe practices aboard the vessels.

Still, capsizings and other fishing vessel casualties continued. In 2002, a seiner capsized near Vancouver and became the 152nd capsizing in BC since 1975. Members of the British Columbia fishing industry recognized they needed to take a more strategic role in

improving safety and hired a fishing industry safety coordinator to look at ways the fishing industry could develop its own programs to reduce injuries and fatalities.



Captain Tim Joys aboard the *Sena II* takes his crew through an abandon ship drill. All photos courtesy of Fish Safe.

WorkSafeBC acknowledged the importance of industry sectors developing their own safety programs and worked to facilitate the “Fish Safe” program that en-



Fishermen participate in the stability education program.

courages fishermen to take ownership of safety in collaboration with regulations.

It's All in the Presentation

Many fishermen live in small fishing communities. They and their neighbors are often fourth-generation fishermen. These fishermen consider themselves unique, and rightly so—you have to be a little “unique” to take to sea.

We recently hosted a strategic planning session on fishing safety and hired a professional facilitator. The first question from the audience to the facilitator, whose only job was to make sure we got through the agenda, was: “What do you know about fishing?”

If you have an inspection system that is prescriptive and does not allow fishermen to use their knowledge of the vessel or have input into what procedures they should have in place, you will undermine their ability to take ownership of a safety program. As a result, you could end up with a “compliance only” program that has them just following a formula for the sake of getting cleared to go fishing.

So how do we inspire fishermen to incorporate safety aboard? They have to be involved in the development and delivery of education and training programs, and they must be convinced that incorporating safety into their fishing operations will benefit them.

Fish Safe

The Fish Safe program uses real fishermen in all aspects of program development and delivery. For example, the Fish Safe advisory committee brings together

everyone involved in fishing safety, from federal and provincial regulatory agencies to individual fishermen, educational institutions, and marine safety suppliers.

By providing a forum to discuss safety concerns and work on solutions, regulators are better informed on the realities of fishing, and fishermen provide insight on how to make regulations relevant and effective. Marine safety suppliers hear what needs to be done to make their products effective in a fishing environment, and all kinds of relationships are built. This forum has also created the needed support for Fish Safe to access funding from provincial and federal agencies.

It's Working

Over the last three years, Fish Safe has provided a four-day stability education program to more than 800 fishermen in 26 different communities in British Columbia. The Applied Research Evaluation Services of the University of BC evaluated the program and noted:

“Participants ranked the course, instructors, and instruction very highly, with particular emphasis on the practical application of course content and the relaxed and interactive course delivery. Not only did 96.8 percent gain knowledge from the course, 60.1 percent made substantive changes on their vessels to increase stability and safety. As evidence of how worthwhile they thought the course was, 94.4 percent recommended the course to others.”¹



The author, Gina Johansen, is a third-generation fisherman out of Prince Rupert, BC.





Fish Safe uses real fishermen in safety ads.



In 2009 we had no fishing fatalities and no capsizings.² Although this is a very positive indicator, we don't plan to hang our hat on this statistic. We still have at least the same amount of fishermen to reach and have now started cycling the first 800 through a one-day stability refresher course focusing on human factors.

For more INFORMATION:
For more information, go to www.fishsafebc.com.

Safest Catch

The good work and the good news continue. We recently launched the "Safest Catch" program, which trains fishermen as safety advisors. These advisors provide one- or two-day onboard workshops to their peers, providing tools and direction to the master and crew on how to develop their own safety procedures, emergency drills, and safety equipment orientation.

Within the first six months of the program, we have engaged more than 120 vessels with amazing results. Immersion suits are being dusted off and tested, life rings

that have never been taken off their holder are being used in a life ring toss, and the mystery is taken out of testing an emergency position-indicating radio beacon. Most importantly, Fish Safe advisors strive to impart the information needed for fishermen to incorporate safety into their regular operations and not just what they do when an inspector is around.

The benefits of regular drills and procedures come to light quite quickly. Many "A-ha!" moments make believers of the fishermen receiving the information as well as the fishermen delivering it.

About the author:

Gina Johansen, Fish Safe Program Manager, has owned and fished several seine vessels in the herring and salmon fisheries. She has an extensive background in project management and marketing, and has provided marketing and quality programs for the BC seafood industry since 1992. Her experience as a third-generation commercial fisherman and the unfortunate loss of her father and uncle in the capsizing of a fishing vessel has given her the motivation and insight to develop common-sense safety programs for her peers in the commercial fishery.

Endnotes:

- ¹ Applied Research Evaluation Services of the University of BC, Executive Summary, Fish Safe Stability Education Program, May 2009.
- ² WorkSafeBC, 2009 statistics.



Operation Safe Crab

A port-by-port, just-in-time pulse operation of targeted vessel safety compliance checks.



by MR. DANIEL HARDIN
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The Problem

In 2008 the National Institute for Occupational Safety and Health (NIOSH) released a study that dubbed the Dungeness crab fishery off the Oregon and Washington coast the most dangerous fishery on the West Coast.¹

Why is this? While the Dungeness crab season lasts from early December to August, consumer demand is highest during the Christmas holiday season. This, along with other economic factors, can create an annual “race to fish.” Additionally:

- Oregon and Washington ports are located at river entrances with hazardous bars.
- Winter presents the worst weather of the year off the Pacific Coast.
- Although the crab season is open December through August, 75-80 percent of all Dungeness crab is landed during the first two months of the season.
- Pots are typically fished in relatively shallow water, where surf conditions are at their worst.
- Crabbers operate with gear over the side, at slow speed, abeam to the seas and swell.

- Stacks of loaded pots on deck raises a vessel’s center of gravity, lowers freeboard, and reduces intact stability.

A worse set of operating conditions is difficult to imagine.

Objective: Improve Safety in This Fishery

District 13 and 17 staffers were aware of the hazards in this fishery and had been keeping statistics regarding Coast Guard dockside safety examinations since 2003. With this new NIOSH “distinction,” they determined that conducting safety examinations specifically focused on improving vessel stability and verifying that primary lifesaving equipment was on board, in good condition, and ready for use would greatly reduce the current fatality rate.

And so they launched “Operation Safe Crab,” a port-by-port, just-in-time pulse operation consisting of vessel safety compliance checks.² Coast Guard personnel focused their initial efforts on ports with the greatest concentrations of crab vessels and scheduled the exams close to the start date of the season. This provided the best chance of interaction with the fishermen (no point visiting empty docks) and gave the vessel operators

time to address any safety concerns before the official season start.

With the goal of keeping the safety compliance checks to 15 minutes or less, Coast Guard examiners worked through a checklist that included items such as:

- Immersion suits in serviceable condition with personal marker lights, in a readily accessible location.
- Survival craft checked to ensure they have been serviced, of sufficient capacity for all aboard, and stowed in a readily accessible or float-free location.
- If used, survival craft hydrostatic release properly installed and not expired.
- Emergency position-indicating radio beacons self-tested by the operator, batteries not expired, located in a float-free location if required, hydrostatic release units not expired, and properly registered with NOAA.
- Freeing ports adequately sized and kept clear.
- Watertight envelope of vessel maintained.
- Minimum freeboard midship not less than six inches.
- Downflooding points above 35 degrees.
- Evaluate stability of vessel with roll period test, if warranted (see sidebar).

Vessels with discrepancies were issued a captain of the port order holding the vessel to the dock. The decision criteria for the order: If the vessel had been discovered at sea during a boarding with the same condition, would the voyage be terminated?

Compliance*

Commercial fishing industry vessels are classified as uninspected vessels and are not required to undergo Coast Guard inspection. Regardless, these vessels must comply with the requirements of 46 Code of Federal Regulations Part 28, and are traditionally examined for compliance during fisheries and law enforcement boardings at sea.

So can the Coast Guard compel mandatory compliance with safety compliance checks prior to vessels getting underway? After studying various sources of legal authority, planners determined that this effort fell into a bit of a “gray area”³ and decided the dockside safety checks would be consensual. Given the vital importance of examining as many of these high-risk crab vessels as possible, however, district commanders encouraged examiners to communicate that we would prefer to do these checks at the dock, where it is much safer for both

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Does a Safety Compliance Check Make a Difference?

We analyzed the data on the fishery and the Coast Guard’s efforts, with the goal of answering three questions:

- Is there a statistical correlation between having a safety compliance check (SCC) and not having a fatal casualty?
- How efficient has the Coast Guard been at performing safety compliance checks, as described by the percentage of SCCs done on vessels in the target population—did the SCC hit the right target?
- How effective has the Coast Guard been at reaching the target fleet with an SCC, as measured by the percentage of target vessels that actually had an SCC performed?

The Data

Crab landing data was compiled from the Pacific States Marine Fisheries Commission’s PACFIN database. Although there are between 1,400 and 1,600 vessels participating in the fishery, the number of vessels landing the vast majority of the product is considerably smaller.

To account for the considerable diversity in total landing weight per season, we used a cutoff of 20,000 lbs. of Dungeness crab delivered per season. This reflects a truer picture of those vessels crabbing in a commercially viable manner, and thus expected to be at the greatest risk, as opposed to the much larger number of vessels that were crabbing incidentally or were making a minimum landing per year to maintain a “fishing history” (to protect their interests should this fishery ever go to a quota-based scheme).

Lastly, vessels that suffered a fatal casualty that were below the 20,000-pound cutoff for that season were added to the total, to account for their presence in the population. Results are shown in table 1.

Table 2 shows that we are reaching between 69 to 83 percent of the targeted high-volume vessels. The chance that a particular vessel in the target fleet actually had an SCC is dramatically lower: between 24 percent and 42 percent (Figure 3).

We attempted to recreate their previous methodology for establishing statistical significance by testing a two-by-two column table using Fisher's exact two-tailed test.¹ It was soon evident that there were too many small and zero values to produce any meaningful results for each season. We then decided to aggregate all the data from the six seasons into one table. The data is shown in table 4, and the resulting two-by-two table is shown in table 5.

This table was tested for odds-ratio and confidence interval.² The resulting odds ratio is 1.2 to 1, with a confidence interval of 0.30 to 4.7. This odds ratio is too low, and the confidence interval too wide (overlapping 1.00) to suggest any statistical significance of the hypothesis that having an SCC is related to no fatalities. Despite the aggregation of six years of data into one table, the left column remains too small to show statistical support of the efforts of these pulse operations. We believe that a higher percentage of the target population with an SCC in the future will result in a higher odds ratio.

Endnotes:

¹ http://en.wikipedia.org/wiki/Fisher's_exact_test
² D.J.R. Hutchon, 2001. Online Statistical Calculator, www.hutchon.net/ConfidOR.htm.

Season	Total Vessels Landing >20k Lbs	Vessels Added Due to Casualty	Vessel Population, N
2003-2004	498	0	498
2004-2005	561	0	561
2005-2006	549	2	551
2006-2007	467	0	467
2007-2008	422	1	423
2008-2009	428	1	429

Table 1.

Season	Total SCCs	Total SCCs on Vessels Landing >20k lbs	%age of SCCs Performed on Vessels Landing >20k lbs	Vessel Population, N	%age of N That Had an SCC
2003-2004	206	155	75%	498	31%
2004-2005	192	155	81%	561	28%
2005-2006	185	153	83%	551	28%
2006-2007	149	114	77%	467	24%
2007-2008	235	176	75%	423	42%
2008-2009	181	124	69%	429	29%

Table 2.

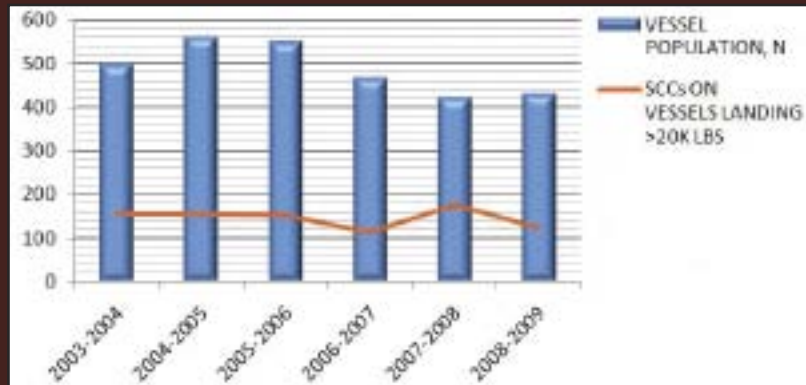


Figure 3.

Season	Vessel Population, N	Fatality w/ SCC	Fatality w/ No SCC	No Fatality w/ SCC	No Fatality w/ No SCC
2003-2004	498	1	0	154	343
2004-2005	561	0	1	155	405
2005-2006	551	0	2	153	396
2006-2007	467	1	1	113	352
2007-2008	423	1	1	175	246
2008-2009	429	0	1	124	304
Total	2929	3	6	874	2046

Table 4.

	Vessel Fatality	No Vessel Fatality
SCC Conducted	3	874
No SCC Conducted	6	2046

Table 5.





STABILITY

The most important and most difficult aspects of the safety compliance checks were issues related to stability. Few of these vessels are required to have stability books, yet loss of stability was the leading factor in fatalities.

In an effort to establish reasonable stability criteria for dockside examiners, limiting measures were employed:

- a minimum six inches of freeboard midship,
- no downflooding points at a heel angle less than 35 degrees.

Vessels that failed either of these were subjected to a simple “roll period” test to calculate a minimum metacentric height.¹ Since the angle of deck edge immersion essentially drives the roll period calculation, vessels with insufficient freeboard were unlikely to pass the roll test.

It is important to note that these criteria were never designed to be a standard for safe loading of a crab vessel, but rather provided a means of identifying stability problems that were clearly especially hazardous.

Endnote:

¹ In a roll test, the vessel is rolled through a small angle of heel several times in still water so that an average time is obtained for a complete roll cycle (from port to starboard and back to port). A value of GM (the metacentric height of the ship) can then be estimated using the vessel's beam. The value of GM determines the slope of the righting curve at small angles of heel, and the resulting area under the curve from zero to the angle of deck edge immersion represents the vessel's righting energy and can be compared to a minimum standard.

the fishermen and our personnel, but it is our intention to check all vessels participating in this fishery.

The message: Participate in the dockside safety compliance check or risk being boarded at sea and sent back to port for safety violations.

Does the Program Work?

While the current statistical analysis does not prove an absolute statistical connection between safety compliance checks (SCCs) and fatalities, the result may have more to do with the size of the sample than the overall effectiveness of the program (see sidebar). Additionally, it's not possible to prove a “negative.” We can't say conclusively that a specific vessel would have experienced a casualty if it hadn't undergone a safety compliance check.

What can we say? Operation Safe Crab has generally done a good job of targeting the “right” vessels—that is, those vessels identified as at the greatest risk. However, the program has not reached its goal of reaching nearly all commercial Dungeness crab vessels.

So, while we believe we're on the right track and that this program has value, we will continue efforts to improve and refine it. We will work to increase the number of safety compliance checks.

Additionally, the list of target vessels can also be used to better prioritize at-sea boardings. Future analysis should include the numbers of at-sea boardings in addition to safety compliance checks, as a more complete picture of overall Coast Guard interaction with the fleet.

About the authors:

Mr. Daniel Hardin is the 13th District Commercial Fishing Vessel Safety coordinator. He is a retired Coast Guard officer with 25 years of service and has been a civilian employee working with the commercial fishing industry vessel safety program since 1998. While on active duty Dan served as an aviation survivalman and aircrewman, then later served as a Coast Guard marine inspector. Dan has a master of science degree from Boise State University in human performance technology.

Mr. Kenneth Lawrenson is currently the 17th District Commercial Fishing Vessel Safety coordinator, and has been involved in commercial fishing safety since 1992. A 1984 graduate of the Coast Guard Academy with an MSE degree in naval architecture from the University of Michigan, he has researched vessel stability, risk mitigation, and fatigue and human factors in marine operations extensively and participated in numerous major marine casualty investigations.

Champion's Note:

*The 2010 Coast Guard Authorization Act now gives the Coast Guard the authority to conduct, and requires vessels to complete, a dockside safety examination at least once every two years. For more information, see “The Coast Guard Authorization Act of 2010,” pages 12-13.

Endnotes:

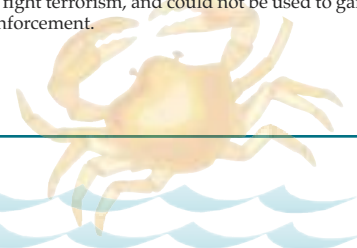
¹ CDC. Commercial fishing fatalities—California, Oregon, and Washington, 2000-2006. *MMWR* 2008; 57:425-9.

² The approach was modeled after a similar successful pulse operation developed by Coast Guard Marine Safety Office Anchorage to reduce fatalities in the Bering Sea Red King, Opilio, and Tanner crab fisheries. C. Medlicott, 2002, “Using Dockside Enforcement to Compel Compliance and Improve Safety,” Proceedings of the International Fishing Industry Safety and Health Conference, Woods Hole, MA, NIOSH.

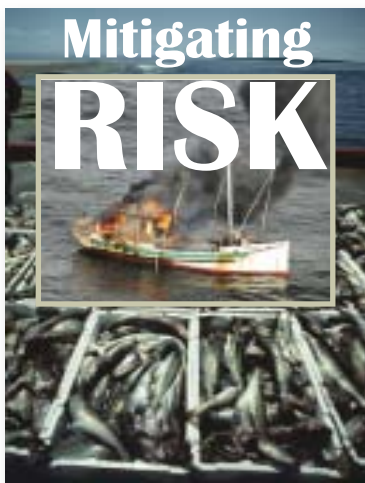
³ 14 U.S. Code 89 grants the Coast Guard authority to board any vessel in U.S. waters without a warrant.

33 CFR 160 provides the COTP authority to compel a vessel to operate in a manner directed by the COTP, but does not allow Coast Guard personnel to gain access to those vessels.

33 CFR 6 authorities for Coast Guard boardings provided by the Magnuson Act were enacted to fight terrorism, and could not be used to gain access to a vessel for safety enforcement.







Alternate Safety Compliance Programs

USCG and affected industry parties strategize to target safety performance variability.

by Ms. LESLIE J. HUGHES
*Director of Government and Industry Affairs
 North Pacific Fishing Vessel Owners' Association Vessel Safety Program*

CDR CHRIS WOODLEY
*Chief of Prevention
 U.S. Coast Guard Sector Puget Sound*



A U.S. Coast Guard marine inspector examines watertight integrity on a fish processing vessel. USCG photo.

The Coast Guard Authorization Act of 2010 provides for the development of regional and fishery-specific safety programs, known as "alternate safety compliance programs" (ASCP). Such programs provide an al-

ternative safety standard to existing vessels that cannot meet future requirements of vessel classification and loadline.

In fact, the 13th and 17th Coast Guard Districts have had much success with this kind of regional approach. Additionally, the recent Alternate Compliance and Safety Agreement (see related article) has resulted in a comprehensive vessel inspection and training program for more than 50 catcher-processor vessels operating in the Bering Sea / Aleutian Island region.

Measuring Risk in the Fishing Industry

Since 1990, the National Institute for Occupational Safety and Health (NIOSH) Alaska Pacific Regional Office has monitored the safety performance of fishing fleets throughout Alaska by measuring individual fleet fatality rates. Fatality rates are measured by comparing the ratio of the number of fatalities to an occupational risk exposure.

This operational risk exposure measurement is based upon several variables including:

- the number of vessels operating,
- the number of days the vessel is at sea,
- the number of crewmembers exposed to the occupational risk.



A U.S. Coast Guard marine inspector checks that immersion suits are donned properly during a emergency drill compliance check. USCG photo.

Review of this data clearly demonstrates that fatality rates and causal factors are highly differentiated among vessel types, fishery gear, species being fished, and geographic region.

Risk is Regional

For example, a recent safety study found that in the waters of the state of Alaska there were nearly 60 different vessel/gear/species combinations, with each fishery having significantly different fatality rates and casual factors.

Some of these fisheries had high rates of falls overboard related to gear-specific operational practices, some had problems with vessel stability, and other fisheries had a large number of capsizing events due to poor weather and local geographic features. Other fisheries had virtually none of these problems.

Alternate Safety Compliance Programs

Once a fishery has been determined to be high-risk and considered for an alternate safety compliance program, the Coast Guard and affected industry parties consider which strategies could prevent fatalities or vessel losses. Specifically, mitigation strategies should focus on achievable improvements, with some of the following considerations in mind.

Training. Are the risks associated with a particular fishery such that crewmembers would be better prepared to deal with the most common emergencies if they had more extensive training and/or if additional crewmembers received training? Is there a need for customized training to address the particular hazards a gear type encounters? Do crews actually conduct drills on a regular basis? Is there a need for increased compliance?

Structural considerations. Are vessel losses due to poor hull condition, downflooding, overloading, or a combination of these? Are vessels seaworthy and able to withstand the sea conditions encountered? Do crews maintain watertight and weathertight closures? Do vessels have adequate stability for typically encountered loading conditions? Are captains adhering to vessel loading limits?

Operational factors. Does a vessel need to cross a hazardous bar to get to the fishing grounds? Does the vessel operate in remote areas, far from Coast Guard search and rescue? How many people are aboard the vessel? Is processing conducted on board? Is fatigue an issue? Do crews adhere to watchkeeping standards?

Equipment issues. Does the onboard safety equipment address the most common types of fatalities within the fleet? Is there better or more appropriate lifesaving



equipment? If man overboard fatalities are a problem, do crewmembers wear flotation when working on deck? Do crewmembers wear strobe lights on their immersion suits?

Benefits for High-Risk Fisheries

An effective alternate safety compliance program can provide advantages that allow for:

- government and industry “buy-in” for safety improvements;
- an approach that is tailored to a specific fleet, operating environment, and crew size;
- program requirements that respond to the magnitude of the identified risk.

U.S. Coast Guard photo.

Compliance. Are fatalities occurring within a fleet despite high levels of participation with the Coast Guard Docksider Exam Program? What is the level and quality of interactions with the Coast Guard? Could fatalities be reduced with increased compliance with existing fishing vessel safety regulations? Does the vessel carry required lifesaving appliances? Is lifesaving equipment well maintained and serviceable?

Implementing an ACSP

For an alternate safety compliance program to be successful, the Coast Guard must have a solid understanding of actual industry practices, and risk to the fleet. Industry needs to acknowledge risks and be willing to move forward in order to mitigate them.

True collaboration with industry is vital. As such, each side must sublimate its own agenda to the overall goal of effectively reducing risk. Some guidelines include:

- All parties should understand that quantifying the safety improvements may take years. This should not be viewed as a deterrent to establishing incremental safety improvements.
- All entities must be realistic about what will be required to implement an alternate safety compliance program and adequate resources must be dedicated to conduct the program.
- Both Coast Guard and industry must be flexible regarding how risks can be mitigated as well as how a safety regime can be upgraded. As the alternate safety compliance program for a particular fleet evolves, additional concerns may be discovered and changes to the requirements may result.
- The Coast Guard must assume the lead for compliance with ACSP provisions by providing clear program guidance.
- The Coast Guard must exercise continuous evaluation of industry’s progress and assess the effectiveness of the ACSP.

About the authors:

Ms. Hughes was the executive director of the NPFVOA vessel safety program until 2008, when she became the director of industry and government affairs. She has been actively involved with the commercial fishing industry for more than 35 years and currently serves on the Coast Guard’s Commercial Fishing Industry Vessel Safety Advisory Committee. She has received two Coast Guard meritorious public service awards for promoting safety for commercial fishermen.

CDR Chris Woodley is currently chief of the Prevention Department at Sector Puget Sound. As a 20-year career marine safety officer, he has enjoyed the unique fate of being able to collaboratively work with the North Pacific fishing industry in multiple tours and capacities as a senior marine inspector, an investigating officer, an oil spill responder, and as a fishing vessel safety/fishery management policy analyst. CDR Woodley graduated from the University of Oregon and also has a Master of Marine Affairs degree from the University of Washington.

Better Safe Than Sunk

Massachusetts fishermen find value in hands-on safety training.

by DR. MADELEINE HALL-ARBER
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MIT Sea Grant College Program*

DR. KARINA LORENZ MRAKOVCIH
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When the New Bedford, Mass.-based commercial fishing vessel *Northern Edge* sank on December 20, 2004, only one of the six-person crew survived. Reports explained he was the only one of the six to have participated in fishing vessel safety training required for fishing in his native Portugal.

Soon after the accident, New Bedford's mayor Fred Kalisz visited William Hogarth, the head of NOAA Fisheries in Washington, D.C., to discuss improving safety. Subsequently Mr. Hogarth committed to providing \$100,000 toward safety training in New Bedford. A diverse advisory panel including professional safety trainers, a local fisherman, Coast Guard personnel, advisors, and academics was assembled to begin implementation of a safety training program.

A Sea Change

Ultimately more than 1,200 fishermen attended basic hands-on safety training in Massachusetts between 2005 and 2010. Of these, 895 were trained in a program sponsored by the city of New Bedford. Another 307 participated in training offered by the Massachusetts Fishermen's Partnership (MFP) with funding from the Cooperative Research Partners Program of National Marine Fisheries Service Northeast Regional Office, Fisherman's Fund, and various insurance companies.



In an effort to learn what led to this unprecedented level of participation, officials conducted several surveys. A preliminary survey interviewed 30 fishermen during a New Bedford training session. Though this was not ideal, since the participants were interviewed in brief periods between training stations, four interviewers were able to interview almost half the participants.

And the Surveys Said ...

In contrast to expectations, those responding to the preliminary survey did not cite the loss of life on the *Northern Edge* as a motivating factor in their attendance.

- More than half of the respondents noted their captain and/or owner had made attendance either mandatory or strongly recommended.
- Twelve of the 30 interviewed mentioned that they were "curious," "interested," "couldn't hurt," and/or "been meaning to learn more about safety."
- At least two noted that their vessel had new crewmembers and that the workshops were also a good idea as refreshers for those already familiar with safety training.

Ten randomly selected participants in New Bedford training sessions were later interviewed on the phone. When offered a list of reasons from which to select, of the 10 interviewed who took the New Bedford training:



- Six confirmed that the F/V *Northern Edge's* fate did attract them to the training.
- Most (eight of the 10) also noted that either they as owner or captain, or their owner or captain, encouraged participation.
- Five said they had been “meaning to learn more about safety,” one because a boat of his had sunk and another because of horror stories he had heard.
- Two mentioned they came because training was free.
- Seven mentioned they had experienced an emergency on board their vessel, though most of the events were not life-threatening.

Telephone interviews of 17 participants in the sessions sponsored by Massachusetts Fishermen’s Partnership

- Another said he had been run down offshore, so he’s very safety conscious.
- Two owner/captains stressed the importance of their crew being familiar with safety procedures.

Next Steps

All of the sessions were judged useful and clearly presented. The main suggestions were for slightly longer sessions to allow even more hands-on training, particularly for first aid and fire extinguishing.

Two respondents suggested using a more realistic setting for the firefighting simulation; one suggested a vessel and the other an enclosed space. Respondents also recommended that CPR training be added to the first aid module.

Basic stability demonstrations using boat models have been added to the training offered by MFP. As more fishermen are introduced to the primary concepts and see how they might easily be applied to their own vessels, agreement with proposals to require stability assessment might increase.

Unfortunately, icing conditions are believed to have cost the lives of four fishermen and the loss of F/V *Lady of Grace* out of New Bedford in February 2007. Just one week after that, another two fishermen were lost along with the F/V *Lady Luck* out of Newburyport. Flooding was determined to be a possible cause. (See article “Lost at Sea” in this edition.)

The Take-Aways

The tipping point for the fishermen of Massachusetts may have been the loss of the F/V *Northern Edge*, followed quickly by an offer of free training. Community leaders also played a central role in attracting participation in both New Bedford and the small ports where MFP organized training.

The safety project managers found that direct communication with vessel owners and captains by someone they respect is crucial. Crewmember participation was frequently dependent on the captain’s and/or owner’s encouraging or requiring attendance. Timing is also very important, since it is challenging to attract attendance during active fishing periods, but should be available when safety is still on fishermen’s minds.

The workshops also seemed to develop “risk knowledge” among participants so that they began to see safety preparation and training as potentially life-saving rather than simply another bureaucratic require-

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NUMBERS INTERVIEWED	New Bedford on site (30)	New Bedford follow-up phone interviews (10)	Massachusetts Fishermen’s Partnership training participants (17)
Capt/owner suggested	16	6	1
<i>Northern Edge</i>	0	6	1
Meaning to/interested	12	5	5
Horror stories	0	1	0
Past experience	1	1	0
Hands-on	0	0	1
Free	0	2	5
Facilities/proximity	0	2	2
Well-respected	1	2	2
Media	0	0	1
Safety	0	0	4
Regulations	0	0	1
Refresher	0	0	2

Table 1: Results of surveys about reasons why commercial fishermen in Massachusetts have attended safety training.

provided interesting data. In fact, there were almost as many reasons offered for taking the training as there were participants.

- Only one of the 17 interviewed mentioned media attention to accidents.
- Five noted they “had been meaning to take training.”
- Five mentioned they took the course because it was free.
- One noted he fishes alone and believes in “being safety-minded, keeping up with the latest techniques.”



Safety Training Modules

This half-day course consists of an introduction with a short video of vessels sinking and comments from the U.S. Coast Guard safety program officer.

Immersion Suit Module

In this module, participants don immersion suits, jump in the water, swim/float to a raft, and climb in. One interviewee suggested that the experi-



Instructor Tom Toolis and Dana Collier (not pictured) lead an immersion suit demonstration while U.S. Coast Guard members serve as lifeguards. All photos by Dr. Madeleine Hall-Arber.

ence of climbing into the raft could be used by designers to redesign the raft, saying "The first one in the raft helped pull in the next guy, but the fourth guy, who ended on top of the third guy, was overweight. We thought we would have to do CPR!"

Life Raft Module

In this module a trainer displays the contents of a raft, explaining each item and its utility. A raft deployment demonstration using a volunteer participant clearly illustrates the length of rope incorporated into the raft's housing and the force of the deployment.



Workshop trainer Ted Williams explains life raft use.

Flares and Firefighting Modules

During the flares module participants have the opportunity to shoot off a variety of flares and sample the rations kept in the raft. The firefighting mod-



Two fishermen participate in the firefighting module.

ule includes practicing a mayday call and extinguishing fires after an explanation of the different types of fires and extinguishers.

Damage Control Module

The damage control module provided by the Coast Guard offers fishermen a chance to attempt to stem the sudden outpouring of water mimicking actual flooding conditions. A trainer also demonstrates stability issues using vessel models.



A fishing vessel stability demonstration.

One participant mentioned he used the information gained to deal with a problem on his vessel, explaining "After the workshop, I used flood kit pack to plug water coming through hull."



A U.S. Coast Guard at-sea rescue demonstration.

First Aid Module

The Massachusetts Fishermen's Partnership training sessions include a first aid module that addresses basic issues such as how to handle trauma and bleeding. The module also provides information on occupational health issues such as avoiding breathing fumes and particulate matter in enclosed spaces (for example, when sanding lobster buoys).

Most of the training sessions also included an at-sea rescue demonstration by a Coast Guard helicopter team and an opportunity to

look at the helicopter and speak to the team.

Handling Immersion Suits

When the safety training courses began, approximately 30 percent of the immersion suits brought to the courses by the fishermen who owned them failed.

Failures included:

- malfunctioning zippers (the fishermen could not entirely close the suit);
- dried-up neoprene that cracked when unfolded;
- extraneous lights or whistles that were improperly tied to the suit, resulting in tears or holes;
- suits too large or too small for their owners;
- suits so old that the seams ripped when tried on.

One measure of the extended benefit of these training courses is that the trainers are seeing a much lower percentage of failures in the suits among the more recent participants.

Those who had never attended formal training learned that:

- **The suit was harder to get on than they thought it would be.**
- **Getting into the raft with the suit on can be challenging.**
- **Having your own suit is important.**

ment. The significant level of participation in the safety training by the Northeast fishing industry suggests increasing optimism among fishermen about their ability to survive accidents at sea.

Author's note:

This article is largely drawn from Hall-Arber and Mrakovcich's "Reducing Risk to Life and Limb: Safety Training Steps Towards Resilience in Massachusetts' Commercial Fishing Industry," published in *Human Ecology Review* 15:2 (2008). We thank the editors for permission to reprint portions of the article.

About the authors:

Dr. Madeleine Hall-Arber is an anthropologist who has worked with the commercial fishing industry for over 25 years. She is a marine advisor for the MIT Sea Grant Program in Cambridge, Mass. Among other accomplishments, she works with the New England Fishery Management Council's staff to identify social impacts of regulatory change on fishing communities.

Dr. Karina Lorenz Mrakovcich is a professor and marine science section chief at the U.S. Coast Guard Academy. She holds a Ph.D. in fisheries science from Oregon State University. She teaches fisheries biology, fisheries management, and atmospheric and marine sciences.



AMSEA's Port-Based Safety Training



by MR. JERRY DZUGAN
Executive Director
Alaska Marine Safety Education Association

The emerald-green island of Kodiak rises out of the Gulf of Alaska about 25 miles from its mainland, about 200 miles from Anchorage. Commercial fishing has been a mainstay for all of the communities on the island.

Unfortunately, plane fare to Anchorage to take fishing vessel safety training would cost almost \$600. Fortu-

nately fishermen on Kodiak do not have to travel to take safety training: It has been brought to them for years.

History

It wasn't always this way. In the not-so-distant past, Alaska suffered the highest rate of fishing fatalities in the nation. There were no resources, fishing vessel safety training programs, or budget for them for Alaska.

So, with few training resources and great need, individuals from the University of Alaska Sea Grant/Marine Advisory Program and Coast Guard air stations in Alaska pulled together resources from their own agencies. They flew out to remote fishing ports to teach marine safety workshops. In 1983 the University of Alaska produced a four-part "Fishermen's Survival" video series to help in this effort. In addition, a number of safety workshops were given.

Since most of the remote fishing ports strung along thousands of miles of Alaska coastline are not connected by roads, it became obvious that a more permanent training and outreach effort was needed to make safety training available to these far-flung ports.



AMSEA instructor Steven Campbell explains to commercial fishermen how to form a human raft in pool exercise. USCG photo.



The Alaska Marine Safety Education Association

By the mid-1980s, a group of people from these and other agencies formed a non-profit group, the Alaska Marine Safety Education Association (AMSEA), to address the high fatality rates in boating activities. Core principles of AMSEA's safety training program:

- The training had to be meaningful, relevant, and hands-on.
- It had to be delivered to their homeports when fishermen were not fishing.
- Additionally, the training needed to be low- or no-cost to effectively include even small fishing ports that did not have a steady cash economy.

Program Basics

Initial efforts focused on four areas.

First, much of the information on cold water survival at that time was outdated or not appropriate to cold climates such as Alaska, so new information needed to be



AMSEA trainer Mary Chambers trains Sitka teens like Ellen Chenowith, pictured left, in outboard motor safety. Photo by Mr. Jerry Dzugan courtesy of the Alaska Marine Safety Education Association.

incorporated into a cold weather-relevant marine safety manual.

Second, marine safety instructors needed to be trained so remote fishing ports could have their own local training resources. These instructors would know the local fishery and would mostly be credible fishermen themselves.

Third, an inventory of marine safety training gear such as immersion suits, life rafts, wearable lifejackets, etc., had to be established so this gear could be procured, maintained, and sent to instructors in these ports. Many port-based instructors would only teach a few times a year, but needed expensive gear for training. They would be able to obtain this gear through AMSEA in a revolving loan program.

Finally, these instructors would need support staff to help acquire funding, promote safety work-



As part of an AMSEA drill conductor course, Floyd Tomkins (foreground) splits wedges wrapped in cloth to fix one of several flooding problems (similar to a crack in a hull) in AMSEA's flooding control trailer, which was designed based on the USCG's flooding control trailers stationed around the U.S. Photo by Mr. Jerry Dzugan.

Get the Kids On Board

In Alaska, many children work on their family's fishing vessels. They learn to clean fish and other fishing skills at a young age. When a boat is at risk, so are the children, so the survival skills they learn are critical.

Training school children in marine safety is also seen as critical, since the attitudes and behaviors of children are typically easier to influence than those of adults. Since 1986 the AMSEA network has trained teachers in half the school systems in Alaska as well as schools in Maine and other states.

Some school systems start training their children in immersion suit use and marine safety through AMSEA as early as third grade. Some of these former third graders are now taking over their parents' fishing operations and are asking for refresher training.

"AMSEA training" has become synonymous with marine safety training in many parts of the country.

—For more INFORMATION:

For books, curriculum, brochures, DVDs, current information on marine safety, and a quarterly newsletter, go to www.amsea.org.

Results

AMSEA has documented mariners who have been helped in an emergency by the training they received through this community-based instructor network. Research by the National Institute of Occupational Safety and Health has documented that a mariner is one and a half times more likely to survive an emergency at sea if he has taken safety training.¹

shops, maintain training gear, coordinate classes, and perform other duties.

Accomplishments

The first Marine Safety Instructor Training (MSIT) course was held in Sitka, Alaska in 1986. Since that time, more than 1,000 instructors have been trained. These instructors train commercial fishermen from American Samoa to Maine and from Florida to Northwestern Alaska. Almost 10,000 fishing emergency drill conductors have been trained in more than 1,000 workshops since 1990. In addition, over 180,000 fishermen and other mariners have also been provided with hands-on safety training in custom courses on different topics.

Agencies such as the National Marine Fisheries Service Observer Training Program have also used the MSIT training as the basic qualifications for their instructors; thus, all fisheries observers receive this training.

Additionally, the majority of instructors teaching marine safety to commercial fishermen in the U.S. have now been trained in AMSEA's Coast Guard-ac-



Robert Ngugen teaches MAYDAYs to Vietnamese fishermen in Galveston, Texas. Photo by Jerry Dzugan.



cepted MSIT course. This network would not be possible without the collaboration of a network that includes the Coast Guard, Sea Grant agents, marine equipment suppliers, private trainers, and many others. These partners provide survival gear, expertise, funding, promotion, and facilitate training in many ways.

Due in part to these efforts, in the last 20 years the average number of fishing fatalities in Alaska fell from 38 per year to an average of 11.²

About the author:

Mr. Jerry Dzugan is the Executive Director of the Alaska Marine Safety Education Association. He is also currently serving as the chairman of the Coast Guard's Commercial Fishing Industry Vessel Safety Advisory Committee. He has been a lifelong educator and has commercially fished Alaskan salmon and halibut.

Endnotes:

¹ Lincoln, J. (2006). Fresh Seafood at a Price: Factors Associated with Surviving Fishing Vessel Sinkings in Alaska, 1992-2004. Unpublished doctoral dissertation, Johns Hopkins University, Baltimore, Maryland.

² AMSEA analysis.

The Coast Guard and the Alaska Marine Safety Education Association

Partners in fishing vessel safety.

by MR. DAVID BELLIVEAU

U.S. Coast Guard Fishing Vessel Safety Division

With fishing vessel casualties rising in the 1980s and 1990s, the Coast Guard concluded that, in conjunction with writing and implementing new regulations, implementing an aggressive fishing vessel safety training program would help reduce fatalities.

The Coast Guard sought assistance from other organizations to provide products and services to enhance the training infrastructure for commercial fishermen in Alaska and throughout the U.S., and in 2001 it awarded a contract to the Alaska Marine Safety Education Association (AMSEA).

AMSEA focused its training on practical information delivered in a hands-on format. The initial training focused on cold water safety and survivability and was presented to school children, commercial fishermen, and the general boating public in remote areas of Alaska.

Its courses have expanded and now include training for:

- fishing vessel drill conductors,
- fishing vessel marine safety instructors,

“If you rescue a man at sea, you give him his life that day. Teach a man how to save himself, and you save him for a lifetime.”

- fishing vessel crew survivability,
- fishing vessel stability awareness,
- fishing vessel examiners,
- fishing vessel inspection techniques.

Training is not limited to commercial fisherman and their local communities; it is also offered to people such as state and federal employees who work closely alongside the fishing community and industry. Additionally, training locations have expanded to include ports in Hawaii and on the West, East, and Gulf Coasts.

To date AMSEA has trained approximately 9,500 fishing vessel drill conductors, over 1,000 vessel marine safety instructor trainers, 114,300 school children, and 55,000 members of the general public.

For more INFORMATION:

For information on training opportunities, visit www.fishsafe.info.

Survival Through Education

National Marine Fisheries Service observer safety training.

by PETTY OFFICER 3RD CLASS COLIN WHITE
Public Affairs Specialist
U.S. Coast Guard Thirteenth District

National Oceanographic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) observers are an important link in the chain of those who assist in the stewardship of the nation's living marine resources and associated habitats.

NMFS observers in general are recent college graduates with a background in biology or marine science. They work to collect at-sea scientific data required for the conservation and management of marine resources within the United States' exclusive economic zone.

The U.S. Coast Guard and NOAA share a mutual interest in fishing vessel safety and National Marine Fisheries Service observer safety. As part of the NMFS observer program, it is mandatory that all observed fishing vessels pass a Coast Guard commercial fishing vessel safety examination and that all observers participate in marine safety training demonstrating competency in emergency response skills.

"The Coast Guard has been working with the NMFS, providing survival training to the observers since 1998," according to Dan Hardin, Commercial Fishing Vessel Safety Coordinator for the U.S. Coast Guard Thirteenth District in Seattle. "NMFS wanted to make sure the Coast Guard was involved to provide training

to observers on what the regulations are for commercial fishing vessels and what kind of safety equipment should be on board and routinely inspected," he said.

The Training

Observers are trained over a three-week period. For two weeks they learn how to collect catch and by-catch data from U.S. commercial fishing and processing vessels. In the final week, they are introduced to required vessel safety equipment, the use of personal survival equipment, and survival techniques in the water.

"During the training we teach the observers how to determine what the vessel is required to have, in addition to teaching them to use a vessel safety checklist," said Hardin. "The checklist describes each piece of equipment, where each should be located on the vessel, and how each is used."

The last day of survival training combines all knowledge and skills the observers-in-training have been taught into a practical in-water exercise. Observers must don their immersion survival suits in under 60 seconds, demonstrate the proper water entry method, inflate and enter a life raft from the water, display the heat escape lessening posture, initiate methods of arrangement to better signal possible rescuers, and enter a mock Coast Guard helicopter rescue basket.



“The training was excellent,” said Jonathan Fusaro, a recent NMFS observer program graduate. “It was great to have the Coast Guard instructors in the water with us during the practical exercises. I’m more informed of rescue techniques and what to anticipate when rescuers arrive.”

About the author:

Public Affairs Specialist 3rd Class Colin White is stationed at the U.S. Coast Guard Thirteenth District Public Affairs Office in Seattle. PA3 White was previously stationed with Aids to Navigation Team Mobile, Ala. His awards include two Commandant’s Letter of Commendation Ribbons, a Coast Guard Unit Commendation, two Meritorious Team Commendations, a Coast Guard Good Conduct Medal, and two Special Operations Service Ribbons. He recently returned to the Gulf Coast in support of the Deepwater Horizon response.

Putting the Training into Practice

Aboard the *Alaska Ranger*

The *Alaska Ranger* flooded and sank 180 miles west of Dutch Harbor, Alaska, on March 23, 2008. The crew and NMFS observers abandoned ship at night into frigid waters, facing 15-foot seas and 30-knot winds.

The incident marked one of the largest cold-water rescue operations in Coast Guard history. Helicopter rescue crews from Saint

Paul Island, Alaska, attached to the Coast Guard Cutter *Munro* were able to rescue 20 people, while 22 others were rescued by the *Alaska Ranger*’s sister ship, the *Alaska Warrior*. Sadly, five perished in this casualty.

It could have been much worse. Fortunately, an NMFS observer aboard, Jayson Vallee, activated a personal locator beacon, providing

the Coast Guard critical search and rescue information.

He attributed his success and ultimate survival to his training. “The training through NMFS and the Coast Guard made all of the safety and survival equipment familiar,” explained Vallee. “It became second nature, having the ‘muscle memory’ to put on the immersion suit.”



U.S. Coast Guard photos.

Interventions in the Interest of Safety

Training, research, and outreach in Maine's commercial fishing industry.

by Ms. ANN S.N. BACKUS, M.S.
Occupational Safety Instructor
Harvard School of Public Health



Maine's Commercial Fishing Industry

According to preliminary figures from the Maine Department of Marine Resources (DMR) and the National Oceanic and Atmospheric Administration, of the more than 233 million live pounds of fish landed in 2008 by Maine commercial fishermen, the American lobster accounted for 30 percent of the catch, the Atlantic herring for 28 percent, and the cultured Atlantic salmon for nine percent.

In terms of dollar value, however, the American lobster catch accounted for 68 percent of the \$362 million industry in Maine in 2008, cultured Atlantic salmon accounted for 17 percent, and the value of the Atlantic herring catch was only two percent of the total catch.¹

High Dollar, High Risk

Clearly the lobster industry plays a major economic role in Maine. On the other hand, its economic viability and sustainability are of concern. The average price per pound for lobster was at an all-time high of \$4.43 in 2007 and has dropped each of the succeeding years in spite of (or perhaps because of) major increases in landings in 2008 and 2009.²

Fatality rates in the lobster fishery are also of great concern. In terms of casualty data, from 1993 to 2010, according to U.S. Coast Guard First District statistics:

- 29 percent of the deaths were in the trawler industry,
- 24 percent were in the lobster fishery,
- 6.7 percent were divers.

Fishery	Extended period: 1993-2010 data	Recent period: 2007-2010 data
Trawler deaths	29% (49 of 167)	37%(10 of 27)
Lobster deaths	24% (40 of 167)	11% (3 of 27)
Diver deaths	6% (10 of 167)	19% (5 of 27)

If we look at deaths by fishery in the last three years (Table 1) we see that:

- 37 percent were trawler industry deaths,
- 11 percent were lobster fishery deaths,
- 19 percent were diver deaths.

Table 1: Fatalities by fishing industry. Data for 2010 as of 2/1/2010. U.S. Coast Guard First District data.



Mandated Training

In 1995 the Maine DMR supported the apprentice license requirement and apprentice program that became effective in 1996. In November 2006, the Maine Commercial Fishing Safety Council recommended that fishing vessel drill conductor training be part of the apprentice program. Under this program, full-time students and those wishing to become lobstermen (the male is used to describe all in this industry) must complete an apprenticeship that requires 1,000 hours of lobstering over 200 days and successfully complete an accepted Coast Guard fishing vessel drill conductor course and a first aid course.

To date almost 900 apprentices have completed the program.³ Consequently, those entering the lobster fishery have a substantive and practical knowledge of fishing safety. According to the statistics in table 1, deaths in the lobster fishery (USCG First District) have been cut from 24 percent to 11 percent.

In a parallel effort to establish a more safety-savvy cadre of dive tenders for the hand-harvest industry (urchins, scallops, lobster), the DMR collaborated with the Maine Commercial Fishing Safety Council in 2009 to create a dive tender rule and a DMR online diving safety course for tenders. Under the rule, those seeking a dive tender license must pass a test and present current first aid and CPR certifications. As of mid-June 2010, 40 people had been issued dive tender licenses through this process.⁴

In the most recent three years, there was a 19 percent incidence rate of diver deaths recorded in the USCG First District. With dive tenders now presumably alert to unsafe diving situations and able to recognize divers in distress, we hope to see a reduction in Maine’s contribution to this rate.

Research and Outreach

The Harvard Education and Resource Center (ERC) for Occupational Safety and Health is currently one of the hubs for research and outreach activities that engage

Maine’s fishing industry. In 1999 the Harvard ERC launched a lobsterman entanglement study along the Maine coast in collaboration with the Centers for Disease Control/National Institute of Occupational Safety and Health Alaska Field Station in Anchorage, Alaska. After learning that more than 70 percent of Maine lobstermen interviewed had been caught in trap rope, pinned to the deck, or pulled overboard, we initiated an outreach effort to reach lobstermen through mailings, posters, and presentations.

A second Harvard ERC study focused on indoor air quality in lobstermen’s workshops. It showed they are exposed to respirable particulates, volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs) when they scrape, sand, brand, and paint their styrofoam lobster buoys, and to endotoxins when they work with algae-covered rope. These exposures are serious risks for the respiratory, cardiovascular, and nervous systems, and the PAHs from branding styrofoam buoys carry a risk of cancer.

Safety Training	<5 Years Ago	>5 Years Ago	Never
First Aid	24%	42%	34%
CPR	24%	50%	26%
Survival Suit	19%	22%	59%
Life Raft	17%	17%	66%
Drill Conductor	13%	9%	78%
Cold Water	13%	11%	76%

Table 2. Safety training among 259 captains in Maine. Safety Compliance Study, Davis and Backus, investigators.

Outreach efforts associated with this workshop-based air quality study included a number of articles in industry publi-

cations and discussions at the Harvard School of Public Health, a vendor table at fishermen’s forums, and other industry events. During these discussions, fishermen reported anecdotally that they are using more latex and low-VOC paint, wearing respirators more frequently, and working outdoors to reduce their exposure.

In a third major research project, Mary Davis, Ph.D., of the Tufts University Department of Urban and Environmental Policy and Planning, and Ann Backus, M.S., of Harvard collaborated on a study titled “Safety and Compliance in the Maine Commercial Fishing Industry” that was funded by NOAA and the Maine Sea Grant. This study investigated the current level of safety preparedness in the industry from the equipment and training perspectives.



Preliminary statistics show that in general the commercial fishing vessels are well outfitted with safety equipment. However, the seasoned captains had significant training deficiencies. As table 2 shows, only 13 to 24 percent of the fishermen interviewed had completed a particular safety course less than five years ago. Fifty-nine percent had never had survival suit training, and a staggering 66 percent had never had life raft training.

Advocacy

The linkages among key players function to move advocacy and outreach efforts where they each need to go—to the law makers and to the fishermen. Throughout 2009 and 2010, the Maine Commercial Fishing Safety Council actively followed the progress of the Coast Guard Authorization Act in the U.S. House and Senate. The council voted to support H.R. 3619 and the inclusion of Section 804 from the House Bill in the Senate version of H.R. 3619.

Letters signed by council Chairman Elliot Thomas were sent to the Maine and Massachusetts House and Senate delegations urging passage of H.R. 3619, including the fishing safety provisions in Section 804.* The council also advocates for parity across the state registered and federally documented vessels so that vessels fishing side-by-side will have the same safety equipment requirements. Finally, of course, the council fully supports additional training for fishermen.

Future Direction

Fishing safety is—and has to be—a joint effort of government, industry, and private players. I would like to acknowledge those mentioned here and all others who are participating in building an infrastructure that will drive and support a culture of safety in Maine.

About the author:

Ms. Ann Backus, M.S., is an instructor in occupational safety at the Harvard School of Public Health and a member of the Maine Commer-



SAFETY TRAINING

John McMillan, a long-standing instructor of fishing safety in Maine and elsewhere, provides safety training in Maine, including the fishing vessel drill conductor course and first aid training.

He reports he has trained 957 apprentices and fishermen throughout coastal Maine since 2007. McMillan noted, “Many of the students are teenagers, which is a great way to develop the safety culture needed in this industry.”



John McMillan and Coast Guard commercial fishing safety examiner Paul Smith-Valley teach escape techniques using an egress trainer at the 2010 Fishermen’s Forum, Rockport, Maine. Photo courtesy of Ms. Ann Backus.

cial Fishing Safety Council. She engages in fishing safety research projects and authors the columns “FISH SAFE” for Commercial Fisheries News as well as “The Voice of Safety” for The Fishermen’s Voice.

Champion’s Note:

*The act that included these provisions was passed and signed into law in October 2010.

Endnotes:

1. [Http://www.maine.gov/dmr/commercialfishing/recentlandings.htm](http://www.maine.gov/dmr/commercialfishing/recentlandings.htm), accessed June 23, 2010.
2. See www.nmfs.noaa.gov.
3. Maine Marine Patrol data.
4. Maine Marine Patrol data.





The United States Marine Safety Association

Fishing vessel safety advocates for more than 25 years.

by MR. ED MCCAULEY
President
United States Marine Safety Association

MR. RICHARD HISCOCK
Former Member
Commercial Fishing Industry Vessel Advisory Committee

MS. KARI GUDDAL
President
Guddal Enterprises, LLC

MR. TOM THOMPSON
Executive Director
United States Marine Safety Association

In 1983, the U.S. Lifesaving Manufacturers' Association was formed to promote performance, manufacturing, maintenance, service, and training standards for life-saving and emergency rescue equipment. Originally conceived as a manufacturers' association, it expanded to include a broader group of companies and individ-

uals dedicated to protecting life and property at sea, eventually becoming the United States Marine Safety Association (USMSA).

The association has grown from only a handful of people to 130 members. It represents all segments of the



USMSA and the Immersion Suit

During WWII the need for protection from hypothermia became apparent as Allied forces were shot down over the English Channel and torpedoed in the cold North Atlantic. Borrowing on work already begun by the British, U.S. and Canadian experts developed lightweight "exposure" suits. Production ceased, however, when the war emergency was over.

In the late 1960s Gunnar G. Gud-dal, founder of Imperial International, a USMSA member company, invented the modern-day neoprene immersion suit with a water-tight zipper.

In the 1970s, two major maritime accidents¹ and an increase in recreational boating deaths due to cold water exposure focused new attention on cold water survival.

Today, professional mariners are well aware of the importance of the immersion suit.

Endnote:

¹ When the F/V *Crystal S* sank in August of 1974 in the Bering Sea, the life raft surfaced upside-down and the crew struggled to remain on top of it to wait for rescue. Immersion suits were credited with keeping the entire crew alive throughout the ordeal despite frigid waters and inclement weather.

The second and more unfortunate of the accidents occurred on November 10, 1975, as the S/S *Edmund Fitzgerald* went down in the Great Lakes. All 29 crewmembers lost their lives.



The United States Marine Safety Association

A history of support for marine safety.

In 1985 the USMSA supported the Coast Guard with a proposal related to the delegation of its responsibilities regarding factory inspections of life boats and other lifesaving equipment. USMSA is pleased to note that equipment and marine safety inspection remains under the purview of the U.S. Coast Guard.

In 1986 the USMSA urged its members to express their support for pending fishing vessel safety bills. Vigorous support from members would eventually help pass the Commercial Fishing Industry Vessel Safety Act of 1988.

In 2005, the association organized an international life and fire safety systems and equipment summit that brought together industry leaders from around the world. One issue brought to the forefront of this summit was the importance of developing uniform standards for extended service interval life rafts. The exploration of this topic at the summit galvanized the USMSA membership to play an active role as standards evolved. After many years of hard work, the International Maritime Organization published guidance that helped to fill a gap in the International Convention for the Safety of Life at Sea (SOLAS), 1974 regulations, which previously lacked any substantial guidance on life raft design and maintenance.

marine safety industry, including companies involved with safety training; the manufacture, maintenance, and promotion of lifesaving and emergency rescue

For more INFORMATION:

The United States Marine Safety Association
5050 Industrial Road
Farmingdale, NJ 07727
(732) 751-0102
fax: (732) 751-0508
www.usmsa.org

equipment; and classification societies and individuals involved in marine safety.

USMSA and Training

The United States Marine

Safety Association has long been active in facilitating safety training for the commercial fishing industry. The regulations resulting from the Commercial Fishing Vessel Safety Act of 1988 required that drills be conducted monthly aboard fishing vessels by a trained individual.

At that time, however, there was no official standard for training. There were also many ports with no access to trained instructors. USMSA partnered with the New Jersey Marine Sciences Consortium and the Alaska Marine Safety Education Association to develop the curriculum and infrastructure required for this training. This effort resulted in a comprehensive document containing guidelines, lesson plans for safety and survival training, and onboard drill scenarios.

With a comprehensive curriculum in place, the next step was to develop a network of qualified instructors and support them with equipment necessary to train drill conductors. Multi-day instructor training courses were held across the United States. AMSEA took the lead on instruction. USMSA members provided the equip-

ment, personnel, and facilities necessary to conduct the hands-on training. Each course includes life raft inflations, pool and open water exercises, in-water immersion suit donning, distress flare demonstrations, and extended open water life raft exercises.

About the authors:

Mr. Ed McCauley is president of the United States Marine Safety Association.

Mr. Richard Hiscock is a long-time safety advocate. He is a former member of the Commercial Fishing Industry Vessel Advisory Committee and advisor of the USCG Fishing Vessel Casualty Task Force. He was also a member of the senior professional staff on the U.S. House subcommittee on Coast Guard and Maritime Transportation.

Ms. Kari Guddal is president of Guddal Enterprises, LLC.

Mr. Tom Thompson is executive director of the United States Marine Safety Association.

Critical Communication

Understanding cultural factors enhances design and delivery of workplace safety training interventions.

by JEFFREY L. LEVIN, M.D., M.S.P.H.
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Commercial Fishing Vessel Safety*

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The Problem

According to U.S. Coast Guard statistics, the USCG Eighth District, which encompasses the Gulf Coast from Texas to the panhandle of Florida, has the second-

highest level of vessel losses and crew fatalities among commercial fishermen.

How Do You Fix That?

First, work to understand these fishermen. The makeup of the commercial fishing population along the United States Gulf Coast is diverse, with many Asian (primarily Vietnamese) shrimpers.



A trainer presents navigation scenarios in the classroom in Vietnamese. All photos courtesy of the Southwest Center for Agricultural Health, Injury Prevention, and Education.

Cultural barriers can get in the way of critical communication and interfere with receptivity to necessary safety training. For example, during early community interactions with Vietnamese shrimp fishermen, it came to light that many lack basic navigation and communication skills despite many years of experience in the commercial fishing trades. This is compounded by a language barrier, which creates a reluctance to communicate, particularly by radio. All of these challenges can lead to hazardous situations on the waterways.





Mariners practice signaling and communication skills on the bridge of a shrimp vessel.

To successfully communicate with this segment, one must understand and embrace its cultural norms. Compared to other groups, the immigration pattern to the U.S. among Vietnamese is more recent, resulting in stronger cultural ties to their heritage. Furthermore, older Vietnamese refugees have more problems with language acculturation than their younger counterparts. Research indicates this group responds best when training is conducted in their native language by trusted and respected authority figures.

How Does This Work?

Recognizing these issues early on, the Southwest Center for Agricultural Health, Injury Prevention, and Education (SW Ag Center), in collaboration with USCG Marine Safety Unit Texas City, added a module for safety training for Vietnamese shrimp fishermen.

Instructors in the SW Ag Center effort developed typical onboard scenarios that a skilled mariner used to instruct a small group of fishermen in Vietnamese on a vessel bridge. The trainees then practiced the various skills.

Key skills included signaling with the horn and executing a “mayday” call. For this skill training, the students use a model that replicates a vessel’s steering wheel, speed control, horn, and radio to simulate the bridge of a fishing vessel. While video footage of approaching freighters is projected on a screen, the vessel

captains are instructed by an experienced mariner in Vietnamese regarding how to listen to and signal approaching vessels with the horn.

Trainees are given a tip card with English and Vietnamese instructions for conducting a radio mayday call. They practice making the call in English, with emphasis on the essential elements.

Future Direction

Feedback has been highly favorable. The project has demonstrated the importance of considering cul-



An experienced Vietnamese freighter captain instructs a fisherman during the navigation simulation.

tural factors, including language, in the design and delivery of workplace safety training interventions. It has increased acceptance of the USCG as partners in safety, and recognition by individual fisherman of their responsibility to be safe at work. Ongoing meetings with multiple USCG stakeholders will focus on further program development.

About the authors:

Jeffrey L. Levin, M.D., M.S.P.H., is professor/chair of Occupational Health Sciences at the University of Texas Health Science Center at Tyler, and director of the National Institute for Occupational Safety and Health (NIOSH) Southwest Center for Agricultural Health, Injury Prevention, and Education.

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Matthew Nonnenmann, Ph.D., C.I.H., is an assistant professor of Occupational Health Sciences at the University of Texas Health Science Center at Tyler. He is also deputy director of the NIOSH Southwest Center for Agricultural Health, Injury Prevention, and Education.

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MAYDAY CALL FORMAT		
Dịch Từ Tiếng Anh		
Must use channel 16 and speak English when making Mayday Calls Phải Dùng Tiếng Anh và Đài 16 Khi Gọi Cấp Cứu		
Mayday	Mayday	Mayday
Trời Đổ, Cầu Xà Vây	Trời Đổ, Cầu Xà Vây	Trời Đổ, Cầu Xà Vây
Fishing boat	Fishing boat	
Đài là tần định cá/đàn	Đài là tần định cá / Mìn	
My Position: Lat _____ Long _____	My Position: Lat _____ Long _____	
Vị Trí Cầu Tóc: Lat _____ Long _____	Vị Trí Cầu Tóc: Lat _____ Long _____	
My emergency is _____	My emergency is _____	
Tàu Tôi Bị _____	Tàu Tôi Bị _____	
(Flooding, Fire, Man Overboard, Medical Emergency, Engines die) (Hàng Nước, Cháy, Người Tà Xảng Đổ, Gã Người Bị Thương Ấy Định Mạng, Chết Ngủ)		
I have _____ persons on board.	I have _____ persons on board.	
Tàu Tôi Có _____	Người trên tàu _____	
 <ul style="list-style-type: none"> • Điền vào chỗ trống nếu này (tong) bằng tiếng Anh trước khi gọi cấp cứu • Bạn phải dùng tiếng Anh và đài 16 khi gọi cấp cứu (Mayday). Không bao giờ gọi bằng Call phone. Tổng đài của 911 không phải là người đi biển! 		
Created by Captain Mãng Lê, Houston, TX For additional copies contact The Southwest Center for Agricultural Health, Injury Prevention and Education 803.877.5998 • agcenter@stet.edu • COOPERATION Agreement USH 080341		

The laminated "mayday" tip card serves as a tool to help the fisherman communicate the call over the radio in English.



In an onboard training session presented in Vietnamese, the shrimp fishermen listen respectfully to an experienced mariner.



Collaborative EFFORTS



Integrated Safety

A risk reduction program.

by MR. ALAN DUJENSKI

Alan R. Dujenski & Associates, Inc.

I have been helping clients develop safety programs since the early 1990s. Some of my clients had extensive programs in place, but many had just bare bones. Either way, losses continued despite their efforts. Rather than starting from scratch, I sought to develop a program that could be integrated with whatever safety program the client had in place and coined the term “integrated safety.”

The Integrated Safety Process

The concept is simple: An effective safety program must involve all levels of management and personnel in a combined effort to identify potential problem areas and resolve them before an incident occurs.

Sounds simple, right? Stating the goal and end result is easy. Getting there is another matter.

What Is Safety?

Safety is defined as the state or condition of freedom from danger, risk, or injury. A misconception held by many in the maritime industry is that installing safety equipment makes an environment safe. Safety is not equipment—rather, it is a state. Although equipment such as emergency position-indicating radio beacons (EPIRBs) and life rafts are important, they do nothing to reduce the original problem that would require their use.

True safety centers around risk reduction. To be able to reduce risk, you first need to be able to detect a problem. For this, you need to know what is a problem or a potential problem, and then be vigilant for that condition. It is therefore necessary for all personnel to be alert at all times.

The ABCs of Accidents

Before we get into the integrated safety concept, we need to understand the basic elements of an accident. Statistics have shown that accidents are rarely the result of a single event. Take fires, for example. You need three things to start a fire: an ignition source, fuel, and oxygen.

To put out the fire (or to keep one from breaking out in the first place) all you need to do is remove one of these elements. Most other accidents also generally have multiple elements. If you remove one or more of these elements, you minimize or eliminate the possibility of that accident occurring.

Additionally, accidents usually don’t happen without some forewarning. Casualty and accident data over the years bears this point out. For most major accidents, there are about 10 minor accidents that preceded it. If you see these early indications and you take timely corrective action, you can hopefully prevent the accident. This is the cornerstone of the integrated safety concept.

As an example, let’s say a crewmember walks out on deck and trips on a machinery part lashed out on deck and he breaks his leg. About 20 other people have tripped over this same obstruction, but without major injury. Had the problem been identified in the 20 prior occurrences and corrective action taken, the 21st crewmember would not have broken his leg.

The Integrated Safety Action Plan

An integrated safety program is developed with input from management and employees. To be successful this program must have top management, front-line management, and employees buying into and supporting the plan.

First, the collaborators must identify problems or hazards. All the hazards or problems in that particular area are listed and a systematic approach is then taken to deal with one area at a time. As an example, we will use a fire in the machinery space as our initial “hazard.” After the hazards are identified, collaborators work to identify ways to eliminate or mitigate the hazard. Failing that, they create a contingency plan.

Hazard: Fire in the machinery space.

Eliminate the hazard. In some cases the problem can be removed. Eliminate oily bilges, remove flammables from the space, repair leaking fuel lines.

Mitigate the hazard. Some design changes can mitigate the hazard. Say you have noted that your gauges for the fuel tanks are made of plastic tubing. These can easily rupture, or if there was a small fire, they could melt, adding fuel to the fire. These could be replaced with gauges constructed with fire-resistant glass and equipped with flow check valves that stop fuel flow should the gauge glass break.

Develop a contingency plan. You have identified a hazard that can't be removed and can't be designed out. The only other alternative is to have a plan to deal with the potential problem. An example might be an engine that has developed excessive oil leakage. You are finishing up the season and need to schedule an overhaul when you get back. In the meantime, you schedule more frequent checks on the space and bring a portable fire foam unit aboard for the trip.

Finally, the program needs to be dynamic and amenable to modification when warranted. A program that exists only in a binder, or that is so constricting as to make changes difficult, will soon become obsolete and be buried on the shelf with other manuals.

Designing the Program

Once you make the decision to pursue integrated safety, you need to design it in stages, starting at the top. Run through an exercise of hazard identification and decide what to do with the issues. Then do the same thing with front-line managers (supervisors, masters, chief engineers), then the rest of the workforce. For these initial meetings it is usually best to use an outside facilitator.

In each case, the group is taught to identify the safety issues or risks. They are then asked to help decide what to do about them. In subsequent sessions, be sure to involve all levels of management. This creates a team paradigm and facilitates full company buy-in.

These sessions will help you identify practices applicable to your company that can limit the risks. Your final goal should be a written program that is straightforward and easy to use. In many cases, using a checklist will suffice.

You may need to call in a consultant to ensure you meet regulatory requirements. You will have an excellent foundation for the consultant to assist you in building a final plan that is usable and designed to fit your company.

An Ongoing Process

Once you have your final, written integrated safety program, you'd think your work is done, right? Not quite! You're just beginning. You must continually evaluate the safety program, work environment, and employee training needs.

The steps should look something like this:

- Ensure all personnel receive training on the integrated safety program.
- Create an “action team” to monitor the program and implement updates and any corrective actions. Ideally the action team should consist of a master, engineer, deckhand, port engineer or port captain, and representatives from different company vessels.
- Tap an “audit board” made up of a port captain, port engineer, and operations manager to review the action team's efforts and provide the CEO an annual review of the past year's injuries, mishaps, accidents, items of concern, and any recommendations for improvement.

About the author:

Mr. Alan R. Dujenski is the president of Alan R. Dujenski & Associates, Inc. He graduated from the Coast Guard Academy in 1971, and his Coast Guard marine safety duties included shipboard engineering, technical plan review, vessel inspections, and port operations. Subsequent to his Coast Guard career, he provided maritime regulatory and safety advice to a major insurance broker and served as marine superintendent for an offshore oil drilling company.

Why Safety Programs Fail

Management is not fully committed. If a safety program does not get full backing from all levels of management, it will never achieve its full potential and is doomed to fail. The insincere attitude makes its way down to the workers.

The program is not a product of all levels of management and crew. Programs where one of the management staff members or a safety manager or outside third party writes up a safety plan and gives it to the workers usually die an anguishing death. These plans generally do not incorporate the practical applications the workers encounter, or they are written in such great detail that they are impractical to refer to on a regular basis.

Training programs don't address applicable risk. At times companies send their personnel to courses required by a regulatory agency without analyzing the requirement or researching the course. Such a haphazard approach is like pouring money down the drain.



Collaborative EFFORTS



Breaking the Chain

Using risk assessment scores to prevent fishing vessel casualties.

by MR. JERRY DZUGAN

Executive Director

Alaska Marine Safety Education Association



Mark and Kelly Klinger troll for salmon in Salisbury Sound, SE Alaska. Many salmon boats are family-run fisheries, so children learn to fish and act safely on a vessel from a very young age. Photo by Ms. Deborah Mercy.

Commercial fishing vessels in the U.S. are arguably the most complicated vessels of their size. A 45-foot fishing vessel can have sophisticated navigation electronics; engines; generators; hydraulic systems; freezer systems; storage systems for products; living, eating,

and sleeping quarters for a crew; and, of course, as much fishing gear as possible.

In addition, most vessels leave port with secured cargo in watertight compartments that are not opened until they reach the next port. This is not so with commercial fishing vessels, which have the unique distinction of opening their watertight spaces to take on “cargo” while out on the ocean—the highest-risk environ-

ment in which to conduct such an activity. It is not surprising, then, that commercial fishing is listed as one of the highest-risk occupations in the United States.

continued on page 70

Risk Assessment Scoresheet
FISHING

Complete the assessment, assigning each element a numerical value of 1-5 with 5 being the highest risk. Use this assessment to identify high-risk elements and consider methods to reduce risk in those or other elements.

The following situations override the risk assessment, so the vessel SHOULD NOT LEAVE.

- storm forecast
- hull integrity problems
- expired and/or damaged or missing safety/survival equipment
- power plant(s) and machinery not fully operational
- bait, food, fuel, ice, fishing gear not sufficient for trip

ELEMENT	ASSESSMENT CRITERIA	RISK VALUE
TRAINING	Level of safety training of crew Classroom vs. hands-on training Prior training from other sources Monthly, thorough drills conducted	
CREW EXPERIENCE	Amount of experience among individual crew Does crew have substantial fishing/boat experience and skills? Age of crew and level of physical fitness CG License? Stability training? Drill conductor certified?	
OPERATOR EXPERIENCE	Does the captain/operator have a background and experience in this type of fishery and this type of vessel?	
LOCATION	How remote are the fishing grounds? How far is help if needed from Coast Guard and other resources? What risks are presented by the locations (currents, "blow holes," distance from shelter in case of rough weather)?	
WEATHER	How dangerous is the predicted weather or weather typical for this time of year? For this trip? How will this impact bar crossings?	
EQUIPMENT	Do vessel and crew have proper safety equipment such as life raft, immersion suits, EPIRB, personal PFDs for deck work, bilge/fire alarms, etc. and redundancy? Gear within certification? Extra non-required gear such as dewatering pumps? Dockside exam sticker within last year?	
COMPLEXITY	What is the overall complexity of the fishing operation? Length of trip, crew fatigue, crew size, complicating variables, size of operational area, economic limitations, competitiveness of fishery?	
HULL/GEAR	Hull integrity, recent survey/classification, general condition of hull, gear and machinery Recent changes/weight affecting stability?	
<p>A total score of 8-15 is low-risk. A score of 16-24 requires caution, and 25-40 is high-risk. Use similar score breakdowns if certain elements are given greater weight than others. Identify elements or areas that require special emphasis. To lower overall risk due to a high-risk category you do not have control over, look for ways to lower risks in another category you do have control over.</p>		

This score sheet was adapted by the Alaska Marine Safety Education Association and refined by the Coast Guard's Commercial Fishing Industry Vessel Safety Advisory Committee for fishing vessels.



Risk Management

Commercial fishing vessel casualty reports often list one or two reasons for a vessel's loss. However, a problem such as "flooding" or "capsizing" does not give a complete picture of the chain of events that led to the loss. Vessel casualties usually occur as a result of widely varying factors that may include crew fatigue, vessel maintenance and upgrade history, and fisheries management regime, along with many other issues.

Additionally, this industry includes hundreds of different types of fisheries and vessels. Some fishing vessels may fish only in the summer in southern coastal waters or in the winter in the Bering Sea. They may be single-handed operations or have a crew of well over

100 people. Therefore a "one-size-fits-all" risk management program will not be very effective.

To assess risks more systematically and apply methods to lower risks more precisely, the unique characteristics of individual fisheries and casualties must be examined. The Alaska Marine Safety Education Association



The spring herring roe fishery in Sitka, Alaska, lasts only a few hours, with about 50 fishing vessels participating. It is one of the last large commercial fisheries for herring in Alaska. Photo by Mr. Jerry Dzugan.



Salmon seining usually takes place in areas close to where salmon are returning to their home streams. The vessel's seine skiff pulls the net closed. Photos by Mr. Jerry Dzugan.

(AMSEA) has identified eight areas that should be examined for every fishery.

Casualty Data

As a first step, it is important to determine in what type of fisheries the fatalities, injuries, and vessel losses are occurring. The amount of effort and resources placed in managing risk in fisheries should be proportional to the risk, as demonstrated by the statistics.

Type of Fishery

A description of a fishery should include the typical number of crewmembers, length of trips, and description of gear types. It should also address how the product is stored and processed.

It would also be useful to know the permitting systems the fisheries work under. For example, are they open-access permits? Is each vessel held to a catch limit? If there are a limited number of permits, how many exist? Are the permits locally owned?

It is also important to determine under what type of fisheries management program the fishery operates. Some management programs encourage a "race to fish" in any weather. Some limit crew size, which can lead to fatigue or cause other unintended consequences that increase risk. Fisheries that are either over- or under-capitalized can also have inherent risks.

Vessel Types and Hazards

Vessel size, age, layout, and how the gear is operated can indicate risks. If the vessel participates in other fisheries and changes fishing gear, there are implications for stability and other hazards. One can expect certain fisheries that use power blocks and winches will have more crushing injuries, while hook-and-line fisheries will have more cut and punctures-type injuries.

Environmental Hazards

The geographic location of a fishery, the season of the year, the distance offshore, remoteness from rescue resources, water temperature, seasonal storm patterns, and predictability all affect risk.

The assessment should also take into consideration navigational challenges including crossing hazardous bars or transits involving complex navigation, currents, natural hazards, and other traffic.

Subjective Hazards

Issues such as operator and crew experience, fatigue, over- or under-capitalization, traditions, attitude, economics, culture, crew communication, and drug and/or alcohol use all affect risk and should be examined.

Salmon trolling often occurs in the Alaskan summer by solo fishermen or family members in small vessels. Photos by Mr. Jerry Dzugan.



Safety Requirements and Level of Enforcement

Because safety regulations differ depending on the size of the boat and the number of crewmembers, whether the vessel is documented or state numbered, temperature of the water, and other factors, the level of safety requirements on a vessel will have an effect on risk.

Generally, the larger the vessel and the farther offshore it works, the greater the safety requirements.

Stability

Casualty reports and statistics should demonstrate which fisheries are known to have more stability issues and determine the cause of stability problems in a fishery. Gear hang-ups, icing, downflooding, improper loading, heavy weather, and other factors may be problems in some fisheries, but not in others. Vessel size and stability requirements and enforcement will also be factors in assessing risk in a fishery.

Implementation

It is important to recognize that the risk factors in an individual fishery can change quickly. Fishing can be

restricted suddenly to protect a resource, the price of fuel can soar, the value of product can drop, or a season of particularly bad weather can occur.

Vessel owners can take a proactive approach in managing the ever-changing world of risk in their fisheries. In most cases, these operators will be the first ones to notice the changes.

A basic risk assessment score sheet (see sidebar) filled out at the beginning of every season or trip can remind the operator of changing risk. One of the most useful aspects of this risk score sheet is that it makes the operator think about every

aspect of the operation in a systemic way. In addition, it allows the operator to decrease overall risk by making changes in controllable areas.

About the author:

Jerry Dzugan is the Executive Director of the Alaska Marine Safety Education Association.

He is currently the chairman of the Coast Guard's Commercial Fishing Industry Vessel Safety Advisory Committee. He has been a lifelong educator and commercially fished Alaskan salmon and halibut.

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Great Lakes Commercial Fishing

Success through partnerships.

by LCDR WM. ERIK PICKERING
Assistant Chief
U.S. Coast Guard District Nine
Inspections and Investigations Branch

When most people think of commercial fishing, they think of ocean-going vessels; almost no one thinks of the hundreds of commercial fishermen that ply the waters of the Great Lakes. The general public is also probably unaware that many of these fishermen are members of the many tribal nations that share the waters with various states bordering the Great Lakes.

In 2001, a group of Great Lakes tribal nations (the Bay Mills Indian Community, the Sault Ste. Marie Tribe of Chippewa Indians, the Grand Traverse Band of Ottawa and Chippewa Indians, the Little River Band of Ottawa Indians, and the Little Traverse Bay Bands of Odawa Indians) formed the Chippewa Ottawa Resource Authority (CORA).

Coast Guard Involvement

To oversee the fisheries management and enforcement of their tribal vessels, the Coast Guard signed memorandums of agreement (MOA) with the CORA tribes for the enforcement of federal commercial fishing vessel regulations. These MOAs also established guidelines for cooperation among CORA members and the USCG concerning the enforcement of laws relating to commercial fishing vessel safety on waters within the concurrent jurisdiction of the CORA member tribes and U.S. navigable waters. In addition, two other non-CORA tribes, the Red Cliff Band of the Lake Superior

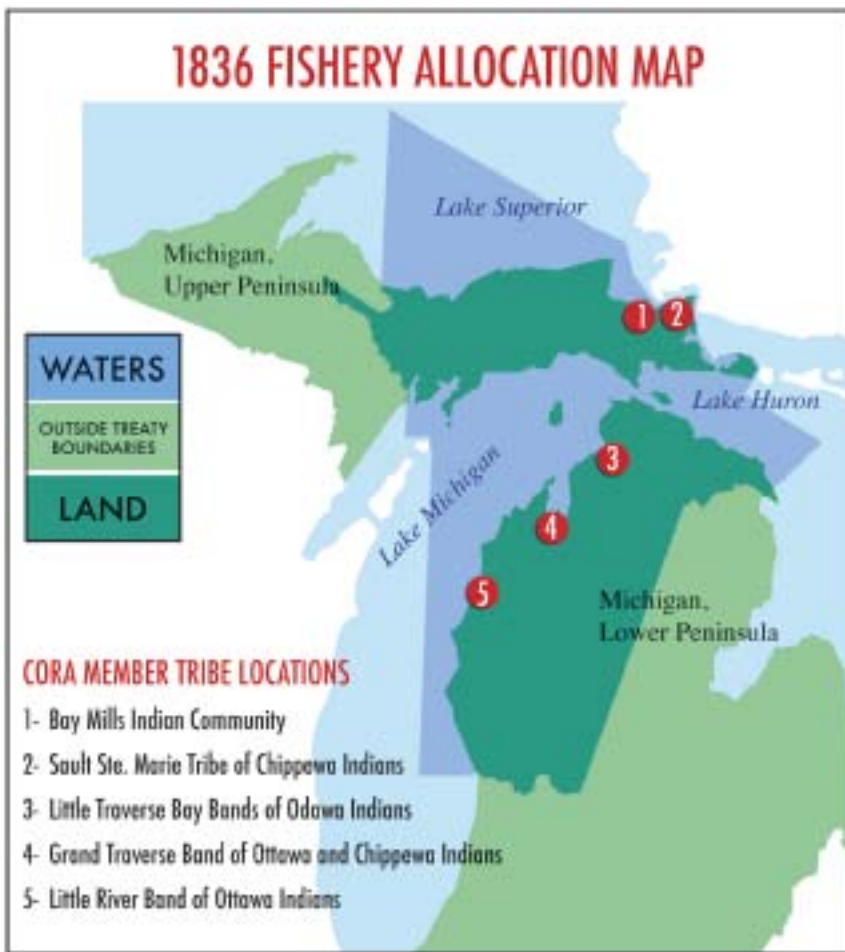
Chippewa Indians and the Keweenaw Bay Indian Community, have also signed MOAs with the Coast Guard.

The MOAs state that the Coast Guard will provide training to tribal law enforcement officers or other persons designated by the tribes and certify them as dockside examiners. This training is generally in conjunction with the commercial fishing vessel examiner course held at Training Center Yorktown alongside USCG active, reserve, civilian, and auxiliary members. This raises awareness of tribal issues and how they relate to commercial fishing vessel safety. Coast Guard Sector Sault Ste. Marie is working to implement a localized version of the course to train additional tribal law enforcement personnel, saving travel and per diem costs and overcoming limited class quotas at Yorktown.

The other unique aspect of the MOA is that when a Coast Guard boarding officer observes a violation of tribal commercial fishing vessel regulations, the case is referred to the tribal court for processing. Should the tribal court not wish to process the case, the Coast Guard retains the right to do so.

CORA exercises many of the same provisions under the MOA as the Coast Guard. If a violation is observed by tribal law enforcement, the case can be turned over to





Tribal treaty waters and locations of CORA tribes courtesy of the Chippewa Ottawa Resource Authority and used with their permission.

the Coast Guard for processing. In addition, they will provide the Coast Guard with copies of their boardings and examinations for Coast Guard records and inclusion into the MISLE database.

Coordinated Efforts

The MOA also covers law enforcement patrols. Recognizing the unique talents of the Coast Guard and tribal law enforcement, provisions are made to not only conduct patrols on their respective waterways, but also conduct coordinated patrols. This approach extends to marine safety education and outreach. The Coast Guard will furnish information regarding dockside examinations to the tribes, who will help to distribute it.

The Result

District Nine sectors and local units have been able to leverage these agreements to expand their ability to ensure the safety of the commercial fisherman. Their efforts seek to prevent personnel and vessel casualties through enforcement of federal regulations and outreach and education to ensure vessels are compliant with federal and tribal regulations.

About the author:

LCDR Wm. Erik Pickering has served in the U.S. Coast Guard for nearly 20 years. He has more than 18 years of experience in the marine safety field, primarily in marine inspections and foreign vessel examinations. LCDR Pickering holds an MBA from National University, La Jolla, Calif.



Understanding Anhydrous Ammonia

by Ms. SARA S. JU , Senior Chemical Engineer, U.S. Coast Guard Hazardous Materials Standards Division

What is it?

Ammonia (NH₃), or anhydrous ammonia, is one of the most commonly produced industrial chemicals in the United States. About 80 percent of the ammonia produced by industry is used in agriculture as fertilizer. The rest is used in household and industrial-strength cleaning products, as a refrigerant gas, for water purification, and in the manufacture of plastics, explosives, textiles, pesticides, dyes, and other chemicals. It is a colorless gas at ambient conditions. It is poisonous, extremely irritating, corrosive, and pungent. It can also easily dissolve in water to form ammonium hydroxide, a caustic solution.

How is it shipped?

Bulk anhydrous ammonia is typically shipped as a liquefied compressed gas. This state is maintained by applying pressure, reducing temperature, or a combination of both. In the U.S., ammonia is transported in pipelines, pressure tank cars, pressure tank trucks, pressure tanks, and refrigerated barges. For long-distance marine shipping, ammonia is usually carried in mid-size liquefied petroleum gas (LPG) ships.

Why should I care?

► Shipping concerns.

Liquefied ammonia is usually shipped at a low temperature. LPG ships or barges carrying ammonia are either fully refrigerated (FR) or semi-refrigerated (SR). The FR LPG ships have a large cooling capacity and keep the ammonia fully refrigerated at -27°F and a vapor pressure below the atmospheric pressure.

SR LPG ships have a less powerful cooling capacity and can keep the ammonia at the liquefied condition with a temperature of -15°F to 5°F and a vapor pressure of 4 to 5 atmosphere pressure. Because ammonia is poisonous, it is very important to prevent it from leaking out of its cargo tanks. Ships and barges carrying ammonia must have a hull structure and cargo tank type that can withstand the low temperature, high pressure, or both. Additionally, material for construction and equipment should be non-corrosive when exposed to the liquid and vapor phase of ammonia.

To protect crew from ammonia vapor, cargo tanks should be vented vertically upward at a point; at least 10 feet for barges, or one-third of breadth or 19.7 feet (whichever is greater) for ships; above the weather deck or the top of the cargo tank or house located above the weather deck. Enclosed spaces containing ammonia cargo tanks must be well ventilated to prevent accumulation of ammonia vapor. Canister masks or respirators approved for ammonia must be carried for each person aboard.

► Health concerns.

Anhydrous ammonia is extremely irritating and corrosive. It is classified by the Department of Transportation as a poisonous, non-flammable compressed gas and defined by the Coast Guard as a “toxic cargo” (46 CFR 154.7).

As a gas, it is an inhalation hazard and can cause breathing difficulty, coughing, lung injury, and a burning sensation and pain in the eyes and respiration system. As a liquid, it can cause burns and frostbite if in contact with tissue. If a person inhales ammonia vapor or has skin or eye contact with ammonia, call a physician immediately and follow the first aid procedures.

For short-term exposure, a 2,500 ppm (0.25%) concentration of ammonia in air may be fatal within 30 minutes. Ammonia has an Occupational Safety and Health Administration permissible exposure limit-time weighted average of about 50 to 60 ppm, which is the maximum average concentration of ammonia in air that a worker may be exposed to over the course of an eight-hour work shift. It also has a threshold limit value-time weight average of 25 ppm set by the American Conference of Governmental Industrial Hygienists. This is the time-averaged concentration for a conventional eight-hour work day and a 40-hour work week, to which it is believed that a worker may be repeatedly exposed for a work life without adverse effect.

► Fire or explosion concerns.

Ammonia is a fire hazard when in high concentrations and at high temperature. Presence of oil or other combustible vapors increase the fire hazard. In case of fire, water spray can be used to blanket the fire and cool tanks.

What is the Coast Guard doing about it?

Ships carrying liquefied compressed ammonia are regulated by the Coast Guard in 46 CFR part 154—Safety Standards for Self-Propelled Vessels Carrying Bulk Liquefied Gases. Barges carrying liquefied compressed ammonia are regulated by 46 CFR part 151—Barges Carrying Bulk Liquid Hazardous Material Cargoes.

These regulations contain requirements for vessel inspection, test, and certification; vessel and cargo tank design and construction; equipment and materials; operations; and special requirements for specific cargoes.

About the author:

Ms. Sara S. Ju is a senior chemical engineer with the Hazardous Materials Standards Division at U.S. Coast Guard headquarters. She is responsible for the Marine Vapor Control Systems Program, including developing regulations, policies, and guidelines.

Chemical of the Quarter

Lessons Learned



from **Casualty
Investigations**



Lady Luck

A regular feature in Proceedings: "Lessons Learned From USCG Casualty Investigations."

In this ongoing feature, we take a close look at recent marine casualties. We explore how these incidents occurred, including any environmental, vessel design, or human error factors that contributed to each event.

We outline the U.S. Coast Guard marine casualty investigations that followed, describe in detail the lessons learned through them, and indicate any changes in maritime regulations that occurred as a result of those investigations.

Unless otherwise noted, all information, statistics, graphics, and quotes come from the investigative report. All conclusions are based on information taken from the report.

Lost at Sea

A small fishing trawler's sudden sinking and loss of its young crew leave questions unanswered.

by Ms. DAISY R. KHALIFA
Technical Writer

When a ship sinks far from shore and into the obscure depths of the sea in such a way that it cannot be salvaged, nor is there any trace of its ill-fated crew, the task of unraveling what might have happened to the vessel is all the more daunting and painful. Such was the case in the Gulf of Maine when the F/V *Lady Luck*, a 52-foot single diesel stern trawler set out on a cold January night in 2007 for a ground fishing trip. Two young men manned the vessel, which had departed from Portland, Maine, and was scheduled to arrive two days later in its home port in Newburyport, Mass.

The 24-year-old master, soon to be married, owned the vessel and had been upgrading it for nearly three years. His 21-year-old deckhand had been in the fishing business for about a year and a half, and was the father of a newborn baby.¹ Both crewmembers separately called their fathers the evening of Wednesday, Jan. 31, 2007, to tell them that the weather was rough, but that they would be arriving home Friday. Sadly, however, the master and deckhand were never heard from again. Shortly before 11:00 p.m. that night, the vessel vanished beneath the pounding seas about 12 miles off Cape Elizabeth, Maine.

The Casualty

The Coast Guard investigation, including an extensive Marine Safety Center (MSC) analysis into the sinking of the vessel, was inconclusive. According to the investigation, the Coast Guard believed the most likely cause of the casualty was capsizing due to water on deck or flooding. Following the investigation, the Coast Guard also believed that the sinking was a very rapid event that did not allow the crew time to respond or access lifesaving gear.

Lessons Learned



from **Casualty Investigations**

Because the vessel could not be recovered and there were no eyewitnesses, it was impossible for investigators to determine exactly what may have occurred on the ship when it sank. Both crewmembers' bodies were also never recovered, and the men were presumed dead. The vessel's last known vessel monitoring system (VMS) position was at 10:03 p.m. on Jan. 31, followed four hours later at 2:00 a.m. on Feb. 1 by an emergency position-indicating radio beacon (EPIRB) signal. The vessel's EPIRB was located within 48 hours of the ship's disappearance, and when the ship itself was found on the ocean floor at a depth of more than 500 feet about one month later, it was not feasible to salvage it so as to thoroughly evaluate its physical condition.

The Coast Guard and the Marine Safety Center relied on available evidence, including footage from a remote-operated vehicle (ROV), and later conducted computer-aided evaluations of the vessel's stability characteristics to analyze different scenarios as to the most likely cause of the casualty. The ROV revealed no catastrophic damage to the vessel's hull or superstructure. It also provided images of the life raft, which was deployed but still attached to the cradle, which indicated that the painter may have fouled, that there was a failure of the weak link that should have freed the raft, or that the weak link was improperly installed.

Because investigators could not determine the exact cause of the sinking, they studied a number of potential causes, including the possibility of flooding and capsizing due to a collision with another vessel. The Coast Guard also relied on results from the MSC stability evaluation and its use of a computer model of the ves-



sel to demonstrate these possible causes. Investigators concurrently analyzed the performance of the vessel's lifesaving equipment—in particular the apparent failure of the life raft's weak link to release the raft from the vessel.

Timeline of Events

The master and deckhand had only marginal success with shrimping on their first day out in the early hours of Jan. 30, 2007. They cut their initial fishing trip short, returning late that morning to Portland Harbor to re-rig to a larger net size. The master drove from Portland to Newburyport that same afternoon to retrieve the larger net. They would set out the next day for some ground fishing south of Platt's Bank in the Gulf of Maine.

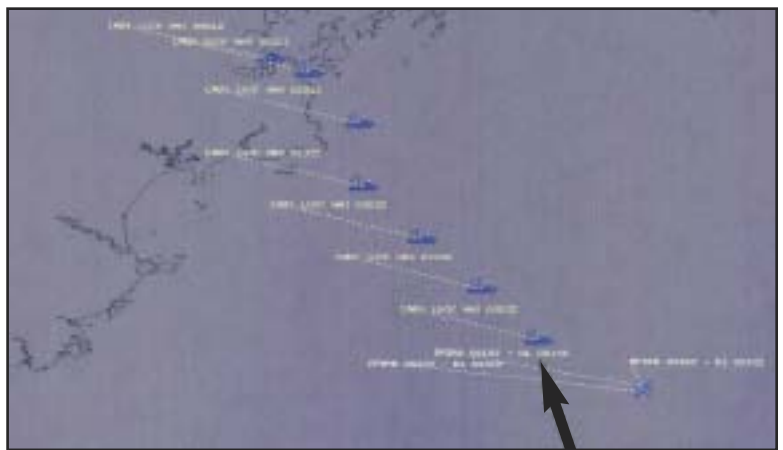
By 7:00 p.m. on Jan. 31, the vessel was underway carrying an estimated 1,000 gallons of fuel and eight tons of ice aboard. The first mate had not worked for 36 hours, and had celebrated his birthday the night before. His father said he witnessed the first mate drink one beer after midnight.

Heading outbound that evening, the vessel passed the inbound F/V *Jubilee* near Spring Point Light in Portland Harbor, and the master of the *Jubilee* stated that the *Lady Luck's* port, starboard, and masthead lights were not energized. The *Jubilee's* master said he hailed the *Lady Luck* twice by radio to alert the crew about the lights, but he did not receive a response and did not see the vessel energize its lights after the call.

At 7:45 p.m., the master spoke with his father and said everything seemed fine, and at 9:30 p.m.—one hour before the vessel was believed to have sunk—the deckhand contacted his family, stating it was a little rough and that he would be home Friday. He also said during his call that the master was below in the forward berthing area, but whether he was sleeping or not could not be confirmed.

Search and Rescue

The investigation provides the VMS positions of the ves-



Vessel's charted track line.
All graphics USCG.

LADY LUCK
trackline

sel from around 7:00 p.m. to its last known position at 10:03 p.m. as the fishing trawler made its way through the Gulf of Maine. Four hours elapsed between the ship's last known VMS position at 10:00 p.m. and the EPIRB first alert, which came at 2:01 a.m.

Upon getting the beacon's electronic signal, the District One command center notified Coast Guard Sector Northern New England. Sector Northern New England issued an urgent marine information broadcast for the vessel, and a search and rescue mission ensued. During the Coast Guard's search and rescue effort, no distress calls were heard from the crew, there were no flares seen in the vicinity of the vessel, and the vessel's life raft was never located. During the search and rescue operations, the Coast Guard located an oil slick and a small debris field.

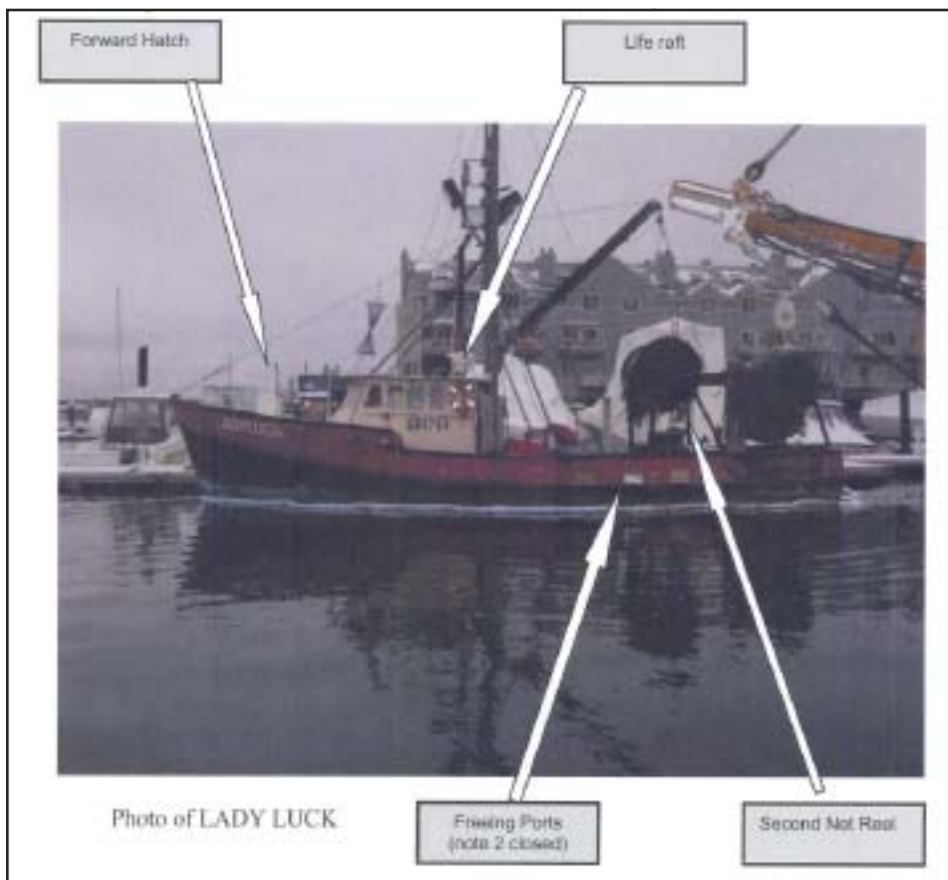
At 9:04 a.m. on Feb. 2, a smallboat from Coast Guard Cutter *Seneca* found the casualty vessel's EPIRB. The EPIRB was found in the automatic position, indicating that neither the master nor deckhand manually activated it, but that it had self-deployed during the sinking. The

search and rescue mission was suspended that same day.

Several weeks later, on March 13, Coast Guard Sector Northern New England enlisted a private contractor to provide equipment and



ROV view of the life raft.



technicians for an ROV to find and visually survey the vessel in the vicinity of the location where the EPIRB was discovered. Using the Coast Guard Cutter *Marcus Hanna* as the staging platform, Coast Guard investigators and contractors analyzed the casualty from the ocean floor in the Gulf of Maine, where the ROV found the vessel 12 miles offshore in approximately 530 feet of water.

ROV Findings

The ROV operation provided investigators and Marine Safety Center analysts the raw data they would need to conduct a comprehensive analysis of the casualty. Through video and photographs taken of the vessel in its position on the ocean floor, investigators observed the vessel resting on its port side, with all of its windows intact and the hull in much the same condition as shown in pictures of the ship before the accident.

The rail around the port to starboard bow was intact, and there was a small indent on the starboard quarter. The fishing gear was stowed, and the outriggers were in the “up” position. The ROV video revealed that the forward watertight door leading to the forward berthing of the vessel was open. According to the ship’s owner, that door would normally be kept closed while

underway, though investigators and the ship’s owner speculated that the door may have been used to abandon ship or it sprang open due to air pressure as the vessel sank. The ROV footage also showed that the watertight door at the rear of the pilothouse appeared to be closed, as did the starboard side pilot-house door.

The boat was equipped with three freeing ports for drainage on each side of the work deck, and the ROV video indicated that two of the three freeing ports on the starboard side were closed. The ROV video could not view the freeing ports on the port side. The investigation report asserts that closed freeing ports

may have prevented water on deck from quickly draining, and therefore may have impacted stability.

The life raft was observed deployed and inflated with the sea painter still attached to the cradle. The ROV footage showed the inflated life raft lying about 40 feet in front of the bow on the ocean floor. From this observation investigators ascertained that the life raft deployed as designed but the sea painter never separated from the cradle. The ROV could not determine the weak link configuration or whether the painter fouled.

Vessel Characteristics

The young master of the casualty vessel was the son of the resident agent and manager of the company that owned it. The master, who was the ship’s primary operator, was instrumental in overseeing about \$100,000 worth of upgrades to the 22-year-old vessel, including new rigging and electronics since the vessel was acquired by the company in April 2004.

For the most part, the condition of the vessel was up to date. The Coast Guard casualty investigation researched the ship’s history as far back as 1997 to records from the boat’s previous owners to better understand the ship’s condition. They learned, for example, that the

previous owner had installed two net reels on a steel pipe “A” frame aft on the work deck—features and data that would need to be factored into stability evaluations and computer modeling.

The last Coast Guard boarding of the vessel in December 2006 found that all the safety equipment was on board, and the boarding team conducted a high water bilge alarm test, verifying that the bilge alarm was in place and functional. During this visit, the Coast Guard indicated that the vessel’s EPIRB had expired, but the crew re-registered the EPIRB as indicated by the new registration sticker on the beacon when it was recov-



Photo of open door.

ered after the sinking. During the December boarding, the Coast Guard noted that as per a previous Coast Guard survey in September 2006, the watertight scuttle cover to the lazarette was corroded.

A fishing vessel safety decal was issued to the ship in November 2005. Though it was an uninspected commercial fishing vessel and not required to hold a certificate of inspection from the Coast Guard, the vessel’s owner took part in the voluntary Commercial Fishing Vessel Safety (CFVS) Program. The vessel received the safety decal following a voluntary safety exam in which the fishing boat was found to be in compliance with all applicable CFVS regulations. The last servicing of the life raft was completed in October 2006.

MSC Stability Investigation

A vessel stability test was not performed on the fishing trawler. At 52.3 feet in length, the vessel did not need to meet stability requirements for commercial fishing vessels, as per the requirements of Title 46 of the Code of Federal Regulations, Part 28, “Requirements for Commercial Fishing Industry Vessels,” which applies to vessels 79 feet and greater in length.

Following the casualty, it was important to evaluate the vessel’s stability characteristics. Marine investigators sought the technical assistance of the Coast Guard’s MSC. Because the ship was unsalvageable and there was limited raw data available, the team was only able to provide a general qualitative analysis based on the boat’s configuration and the weather conditions. The MSC stability evaluation used the requirements of 46 CFR 28.570 as a benchmark, even though the vessel did not have to meet stability requirements for commercial fishing vessels. Their study, using a computer-generated model of the ship based on rough vessel data, indicated that the small fishing trawler lacked strong righting energy in a regulatory comparison to the requirements of 46 CFR 28.570.

The issue of stability requirements loomed large following the loss of the vessel and its two crewmembers. Just one week before, another stern trawler, the F/V *Lady of Grace*, sank in 50 feet of water in Nantucket Sound, and all four crewmembers died. Severe ice accumulation caused that vessel to suddenly capsize, and because her length was 75.8 feet—just shy of the 79-foot regulatory length—the *Lady of Grace* also did not have

to meet stability requirements set forth by Title 46 of the Code of Federal Regulations.

The MSC evaluation shed light on a number of other vessel characteristics that helped illustrate possible causes of the sudden sinking in the Gulf of Maine. Using their computer model of the vessel, the MSC team noted that even limited quantities of water on deck impacted the model’s stability. They observed that flooding of the engine room resulted in a slow reduction of the model’s righting arm. Given the issue with the lazarette, the MSC investigators explored lazarette flooding, observing the following:

“In the study, flooding through the rudder post (as mentioned in the 1997 survey) was analyzed. Further on a September 15, 2006 boarding by CGC *Jefferson Island*, the boarding officer noticed the vessel rode low in the water and the lazarette cover appeared corroded. Although not documented as a potential factor, the quartering seas and demands on the steering system in a quartering sea made the scenario pertinent. Flooding the lazarette induced trim, which after immersion of the deck, quickly reduced the model’s stability. The model capsized beyond the 50 percent flooding point if



ROV view of freeing ports.

the bulwark was submerged for any reason. At 90-100 percent flooding, the aft main deck of the model was submerged.”

Possible Causes: Collision, Flooding, Capsizing

The painstaking MSC stability analysis allowed marine investigators and the MSC team to analyze three potential causes of the casualty. Presented as opinions based on findings of fact, possible causes that were explored in the investigation included a ship strike or collision, flooding, and capsizing.

The notion that a ship strike or collision could have caused the vessel to sink was considered the most unlikely cause. Coast Guard Sector Northern New England compiled a list of deep-draft vessels potentially in the area of the fishing vessel, and they determined that there were no large vessels close enough to the small trawler within the specified time frame. Furthermore, the vessels closest to the fishing boat were inspected by the Coast Guard and found to have no damage to the hull that would have resulted from a collision. The sunken vessel’s owner advised the Coast Guard he believed there had been a large vessel in the vicinity, though this vessel was never identified. The Coast Guard queried all commercial facilities in the Portland, Portsmouth, and Searsport, Maine areas, and verified that all large vessels (including tugs and barges) were at least 12 nautical miles away. Lastly, the ROV footage indicated there was no damage to the vessel that would be consistent with a collision, while noting that about 40 feet of the port side could not be viewed.

The MSC evaluation into flooding as a potential cause of the sinking provided two possible scenarios. Investigators determined that flooding in the engine room would have been gradual enough for crew to re-

spond, and they did not consider this to be a likely cause of the sinking. With regard to lazarette flooding, investigators considered the 2004 and 2006 survey reports that stated, respectively, the hatch was not watertight, and that the lazarette cover may have been corroded. MSC investigators observed through their modeling that lazarette flooding would lead to more rapid and less detectable flooding. Thus, investigators did not

rule out lazarette flooding, stating it could be supported based on past survey information as well as a 1997 survey report that highlighted a rudder post packing leak. The investigation report did state, however, that there was no more recent information available about whether the lazarette hatch was or was not watertight.

The Coast Guard investigation asserts that capsizing due to a rapid loss of stability was the most likely cause of the sinking. The MSC evaluation supports the assumption that capsizing due to water on deck or a combination of water on deck with a flooding lazarette would leave the vessel prone to rapid capsizing, based on the response of the computer model. Moreover, the investigation states that a rapid capsizing supported the lack of distress signals from the crew.

Investigators considered vessel modifications made by the vessel’s previous owner, including two net reels on her stern, but the weight and placement of the modifications were not known. According to photographs of the vessel from a few weeks earlier, it was possible that



Starboard bow of downed vessel.

it might have had low freeboard compared to other vessels. The previous owner stated his opinion about the

vessel's stability, indicating that it was not "snappy" as far as righting was concerned, meaning the vessel righted itself slower than other vessels.

Investigators also considered the eight tons of ice in the holds, which could have shifted and contributed to instability if the boards in the hold were not in place (which they were not able to determine). Lastly, investigators considered ice accumulations caused by sea spray and freezing temperatures, which would add topside weight to the vessel, thus causing instability. The Coast Guard determined that the vessel did not experience icing in the three and half hours it was underway. This assumption was based on testimonies of fisherman who were also underway that night who said icing conditions were not severe enough to impact stability; rather, the ice was only "a little skim coat."

The MSC analysis focused on degradation of stability from water on deck. Based on the computer model, only limited amounts of water were needed to negatively affect stability. The vessel's course exposed it to a quartering sea, making it susceptible to shipping seas from the stern, and if any freeing ports were closed—which they believed to be the case—water on deck would cause a free surface effect, causing the vessel to further lose stability.

Life Raft Deployment and Lifesaving Equipment

The deployment of the life raft was another issue to arise from the sinking of the fishing trawler. Based on ROV footage, the vessel's life raft deployed properly. However, the sea painter appeared to be attached to the cradle, which prevented the raft from separating from the sinking vessel. The ROV operation observed the life raft 40 feet forward of the bow of the vessel and still attached to the location of the weak link.

The Coast Guard investigation indicated that investigators could only ascertain from the video that the life raft deployed as designed but the sea painter never separated from the vessel, and it remained unknown if the life raft surfaced at any time, but only that the life raft was not released from the vessel.

Investigators explored the question of the four-hour delay between the vessel's last known VMS position and the emergency transmission from the EPIRB. The report noted that the VMS is possibly misunderstood as a means for search and rescue, when its purpose is as a living marine resource tool used by the National Oceanic and Atmospheric Administration (NOAA) to monitor fishing activity. However, as with the case of

the sunken fishing vessel, the VMS track was used during the search and rescue mission. Furthermore, while the EPIRB automatically deployed and transmitted, investigators speculated that the EPIRB, because of the four-hour delay in sending a signal after the last VMS transmission, may have been caught in the rigging of the vessel as it tried to float free, or it was trapped under the vessel, or that its release may not have worked properly when initially submerged.

Likely Causes

The Coast Guard investigation cited two primary factors that contributed to the sinking of the vessel on Jan. 31, 2007:

1. The vessel sank in a rapid event that prevented the crew from issuing a distress call, and the life raft's weak link assembly failed to release the raft from the vessel, bringing it to the ocean floor. Investigators believe the sinking was caused by a combination of rough seas, possible flooding in the lazarette, and water on deck that led to instability.
2. With regard to the life raft, investigators stated that the painter may have been fouled as the vessel sank, which may explain the painter's non-release, and raises visibility of the criticality of life raft and buoyant apparatus weak links and their proper installation.

Recommendations and Lessons Learned

The recommendations and actions that emerged from the casualty investigation focused principally on stability requirements and on raising awareness about safety equipment. The first of three recommendations called for the Coast Guard to expedite publishing the stability standards for commercial fishing vessels less than 79 feet in length. The office of the Commandant concurred with the recommendation, noting that the Coast Guard is considering new regulations to establish stability standards for vessels between 50 and 79 feet in length.

The second recommendation advised that there be continued outreach within the fishing community about proper installation of safety gear on fishing vessels. The report stressed the importance of educating ship owners about proper weak link installation and to educate life raft owners on the purpose of the weak link and life raft deployment theories. The Commandant's office concurred and said the agency would continue to implement a strategy for educating members of the commercial fishing industry.

The final recommendation called for a study to examine the feasibility of re-engineering weak link locations from the raft cradle to inside the life raft's tamper-proof canister for Coast Guard-approved life rafts. The Commandant's office did not concur with the third recommendation, stating "The weak link is an installation requirement and, in practice, is usually part of the hydrostatic release unit (HRU), not the life raft." The Commandant's office said, instead, the Coast Guard would update the Navigation and Vessel Inspection Circular (NVIC) 4-86, and said the revised NVIC would take into account new disposable HRU designs and illustrate correct—and incorrect—HRU installations.

Finally, investigators provided comments on the analysis of the casualty that underscored concerns about the deployment of lifesaving equipment. Without hard facts to support their opinions, investigators said they believed one or more of the following were factors in the failure of the life raft to separate from the sinking vessel:

- The hydrostatic release unit, if one existed, did not work.
- The painter was secured directly to the cradle, bypassing the weak link.
- The life raft became tangled up in fishing gear as the vessel sank, preventing it from inflating until it was too deep for the inflation systems to overcome hydrostatic pressure.

The fact that the life raft remained tethered to the vessel because of a design flaw resonated with the public

and within the commercial fishing community, where a fair amount of speculation as to exactly what went wrong with the raft continues. Many in the industry took away from the casualty an important lesson learned with regard to checking weak links before getting underway on another fishing trip.²

The vessel casualty in the Gulf of Maine in which the lives of two young men were taken came only one week after the tragic sinking and loss of four crewmembers on the F/V *Lady of Grace* in Nantucket Sound. Both casualties bore striking similarities, characterized by instability and rapid sinking in the rough January seas off the coast of New England. The urgency of publishing new stability requirements, conducting industry outreach on safety equipment and the purpose of VMS monitoring, and gaining a better understanding of life raft weak link installation surely hit home within the commercial fishing industry.

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About the author:

Ms. Daisy Khalifa is a freelance writer who has worked in the communications field for nearly 20 years. She has written feature and business articles for a variety of publications covering law, technology, telecommunications, real estate, architecture, and history.

Endnotes:

¹ David Abel and Kay Lazar, "Another Fishing Vessel Feared Lost," *Boston Globe*, February 2, 2007.

² Commercial Fisheries News, "Lady Luck: Life Raft Weak Link Failed," Vol. 35, Number 7.



Nautical Engineering Queries

*Prepared by NMC Engineering
Examination Team*

Q
uestions

1. Coast Guard regulations (46 CFR) concerning shutoff valves located inside fuel oil tanks state that the valves _____.
 - A. shall be arranged for local control
 - B. must be made of steel
 - C. must be power-operated
 - D. may be made of cast iron

2. The distance between a generator and its load is 100 feet. What would be the approximate total voltage drop across a two-wire supply cable if the current was 5.5 amperes and the resistance of the wire was 2.525 ohms per 1,000 feet?
 - A. 0.5 volts
 - B. 1.38 volts
 - C. 1.90 volts
 - D. 2.77 volts

3. In a closed feed and condensate system, the drain from the second-stage air ejector returns directly to the _____.
 - A. auxiliary condenser
 - B. loop seal
 - C. atmospheric drain tank
 - D. de-aerating feed tank

4. Which of the turbocharging systems listed operates with the least average back pressure in the exhaust manifold?
 - A. constant volume
 - B. constant-pressure
 - C. pulse-pressure
 - D. radial flow

Nautical Deck Queries

Prepared by NMC Deck Examination Team

Q

uestions

1. A vessel of not more than 65 feet in length must have a collision bulkhead if it carries more than _____.
 - A. 6 passengers
 - B. 12 passengers
 - C. 36 passengers
 - D. 49 passengers

2. How many portable fire extinguishers are required to be located inside the machinery spaces of a small passenger vessel?
 - A. None are required.
 - B. One B-I, C-I is required.
 - C. One B-II, C-II is required.
 - D. One B-II is required.

3. Which statement is true concerning the placard entitled "Discharge of Oil Prohibited"?
 - A. It is required on all vessels.
 - B. It may be located in a conspicuous place in the wheelhouse.
 - C. It may be located at the bilge and ballast pump control station.
 - D. All of the above.

4. A cargo of canned foodstuffs is packed in cartons. Each carton is 36 cubic feet and weighs 380 pounds. What is the stowage factor of the cargo?
 - A. 9.5
 - B. 62
 - C. 212
 - D. 237



1. A. shall be arranged for local control Incorrect answer. See explanation for choice "D". Valves installed in the inside of fuel tanks must be arranged for remote control.
- B. must be made of steel Incorrect answer. 46 CFR 56.50-60(D)(2) states: "Valves for local control outside the tanks must be made of steel, ductile cast iron ASTM A 395, or a ductile nonferrous alloy having a melting point above 1,700°F."
- C. must be power-operated Incorrect answer. See explanation for choice "D". Shutoff valves located inside the fuel tank are to be arranged for remote control only, and are not required to be power-operated.
- D. may be made of cast iron **Correct answer.** 46 CFR 56.50-60(d)(2) states: "If valves are installed on the inside of the tank, they may be made of cast iron and arranged for remote control only."
-
2. A. 0.5 volts Incorrect answer. Choice "D" is the only correct answer.
- B. 1.38 volts Incorrect answer. Choice "D" is the only correct answer.
- C. 1.90 volts Incorrect answer. Choice "D" is the only correct answer.
- D. 2.77 volts **Correct answer. Solution is as follows:**
- Resistance of wire per foot: $2.525 \Omega \div 1000 \text{ feet} = 0.002525 \Omega / \text{ft}$
- Total resistance of 200 feet of wire: $200 \text{ ft} (0.002525 \Omega / \text{ft}) = 0.505 \Omega$
- Voltage drop across wire cable: $V = (I)(R) = 5.5 \text{ amperes}(0.505 \Omega) = 2.77 \text{ volts}$
-
3. *Note: A steam jet ejector is a type of air ejector used to remove air and other non-condensable gases from a condenser. The ejector has no moving parts, and receives the energy to operate from pressurized steam that creates a "pumping action" as it passes through the ejector. Air ejectors are generally multi-stage, consisting of several ejector elements arranged in series.*
- A. auxiliary condenser Incorrect answer. In a two-stage air ejector unit, saturated non-condensable gases removed from the condenser are initially drawn into the suction chamber of the first-stage air ejector. The gases become entrained in the first-stage ejector steam jet, and the mixture is discharged into the shell of a heat exchanger called the intercondenser. Condensate discharged by the condensate pump passes through the intercondenser tubes and condenses the mixture in the shell. Water formed from the condensing mixture is returned to the condenser via a "U"-shaped loop seal.
- B. loop seal Incorrect answer. See explanation for choice "A." To prevent air and other non-condensable gases from the intercondenser being drawn back into the condenser, the intercondenser drain line is fitted with a water-sealed "U"-shaped loop.
- C. atmospheric drain tank **Correct answer.** Gases remaining in the intercondenser shell are drawn into the suction chamber of the second-stage ejector and become entrained in a second jet of steam. The steam and gas mixture is then discharged into the shell of a heat exchanger called the aftercondenser. Condensate discharged by the condensate pump passes through the aftercondenser tubes and condenses the mixture in the shell. Water formed from the condensing mixture is under a slight positive pressure and drains by gravity to the atmospheric drain tank. Non-condensable gases are vented to the atmosphere.
- D. de-aerating feed tank Incorrect answer. The de-aerating feed tank's operating pressure prevents its use as a direct return for the low-pressure drains of the air ejector.
-
4. *Note: In a diesel engine, the two methods utilized for transmitting the energy in the exhaust gases to drive the turbocharger are the constant-pressure system and the pulse system.*
- A. constant volume Incorrect answer. Constant volume is the term used to describe combustion in a gasoline engine. Refer to the "Otto Cycle" for spark-ignition engines.
- B. constant-pressure Incorrect answer. In the constant-pressure system, the exhaust gases from the individual cylinders are discharged into a large common manifold. Since the pressure in the manifold tends to be the average of the cylinder outputs, the turbocharger is provided with a fairly constant-pressure gas supply.
- C. pulse-pressure **Correct answer.** The pulse system permits operation of the turbocharger with the least average back pressure in the exhaust manifold. With the pulse system, the exhaust gases from each cylinder or group of cylinders are admitted directly to the gas turbine through a short exhaust pipe. As a result, the flow of gases to the turbocharger "pulsates." The turbocharger is designed to utilize both the velocity and pressure energy in the pulsating gases.
- D. radial flow Incorrect answer. Radial flow is the term used to describe the direction of gas flow in a turbocharger.

1. A. 6 passengers Incorrect answer.
 B. 12 passengers Incorrect answer.
 C. 36 passengers Incorrect answer.
 D. 49 passengers Correct answer. As per 46 CFR 179.210, a vessel of not more than 19.8 meters (65 feet) in length must have a collision bulkhead if it:
- 1) Carries more than 49 passengers;
 - 2) Operates on exposed waters;
 - 3) Is of more than 12.2 meters (40 feet) in length and operates on partially protected waters; or
 - 4) Is constructed of wood on or after March 11, 2001, and operates in cold water.
-

2. A. None are required. Correct answer. None are required inside the machinery space. A minimum of one portable fire extinguisher is required, of CG class B-II, C-II, to be located just outside the machinery space exit. See 46 CFR 181.500, Table 181.500(a).
 B. One B-I, C-I is required. Incorrect answer.
 C. One B-II, C-II is required. Incorrect answer.
 D. One B-II is required. Incorrect answer.
-

3. A. It is required on all vessels. Incorrect answer.
 B. It may be located in a conspicuous place in the wheelhouse. Incorrect answer.
 C. It may be located at the bilge and ballast pump control station. Correct answer. As per 33 CFR 155.450, a ship (except a ship of less than 26 feet in length) must have a placard of at least five by eight inches made of durable material fixed in a conspicuous place in each machinery space, or at the bilge and ballast pump control station, stating the following: "Discharge of Oil Prohibited."
 D. All of the above. Incorrect answer.
-

4. A. 9.5 Incorrect answer.
 B. 62 Incorrect answer.
 C. 212 Correct answer. The formula for stowage factor computation is cubic capacity divided by weight in long tons. 1 long ton is equal to 2240 lbs.
 The weight of the cargo is given in pounds and must be converted to long tons.
 $380\text{lbs} / 2240\text{lbs} = .1696 \text{ long tons}$
 $\text{Stowage factor} = 36 \text{ cubic feet} / .1696 \text{ long tons} = 212.26$.
 D. 237 Incorrect answer.

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