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SAFETY TRAINING FOR FISHERMEN

Photograph and caption by Earl Dotter

A commercial fisherman demonstrates the correct way to enter the water during a survival suit drill at a local quarry swimming hole in Vinalhaven, Maine, U.S.A.

A PORT-BASED FISHING SAFETY INSTRUCTOR NETWORK, AND THE SECOND FOLLOW-UP STUDY OF ITS EFFECTS ON FISHING FATALTIES (1995-1999) IN ALASKA

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From 1980 to 1989, Jerry worked as a commercial fishermen in the halibut and salmon fisheries in Alaska. From 1987 to present, Jerry has been Director of the Alaska Marine Safety Education Association, which is responsible for training and maintaining a network of fishing vessel and marine safety instructors in Alaska and in other ports of the U.S.

BACKGROUND

Alaska is a land of superlatives: spectacular wilderness, rich wildlife and bountiful fisheries. If Alaska were a separate nation, it would rank as one of the world's top ten fisheries in terms of value, worth over a billion U.S. dollars a year. Unfortunately, these superlatives also apply to Alaska's extreme weather, great distance from rescue, frigid water and high fishing fatality rate.

The Alaska Marine Safety Education Association (AMSEA) was formed as a non-profit organization in the early 1980s in response to the great number of marine related fatalities in the state. It was a grass roots effort, started in Kodiak and Sitka, collaborating with fishermen's organizations such as fishermen's wives, as well as state and federal agencies such as Alaska Sea Grant, Alaska Vocational Technical Center, the U.S. Coast Guard (USCG), Alaska Observers Center, and the National Institute for Occupational Safety & Health (NIOSH).

AMSEA's first priority was to create and maintain a port-based Marine Safety Instructor-Training (MSIT) network that could deliver relevant hands-on marine safety training to Alaska's far flung fishing communities. These port-based

MSITs have experience in local fisheries and have credibility and contacts within the local fleet to conduct and facilitate training.

MSIT training began with a pilot project in 1983 and since that time almost forty of these week long courses have been held, which have trained over 500 Marine Safety Instructors (MSIs) on most coasts of the U.S.. These MSIs, who work for a diverse group of private and public entities, have in turn trained over 100,000 people in various marine safety courses in Alaska, the U.S. and overseas. The people they in turn train include fishermen, agency personnel, school children and professional mariners. AMSEA's next priority has been to maintain the MSIT network with updated cold water related curriculum, educational productions, and training supplies.

In 1991, the USCG required that monthly drills in emergency procedures be conducted on many documented fishing vessels. There are approximately 30,000 of these documented vessels in the U.S. The USCG also required that by 1994, the person conducting these drills be formally trained in the contingencies required during drills.

In 1991, AMSEA developed an 18-hour Drill Instructor (DI) course that was USCG approved and also follows the International Maritime Organization's (IMO) Personal Survival Module. The DI class focuses on the use of survival equipment and proper procedures to use during vessel casualties. It is a hands-on, skills based course. AMSEA then used its MSIT network to deliver the DI course to fishermen's home ports. Most of the participants in the DI course were fishermen who could deliver the monthly drills to their own crews.

Since 1991, over 4,000 people have been certified by AMSEA to be Drill Instructors in over 370 courses. Most of these DIs reside in Alaska. This group represents more than one drill instructor for every two documented boats in Alaska. This is probably the largest single group of trained Alaskan DIs. Important to this study is the fact that AMSEA maintains a database of names and addresses of those trained in this course. Therefore names of survivors and fatalities can be matched to casualty databases. Other AMSEA trained MSIs in other parts of the nation have developed their own USCG approved courses and are not part of our database of trained DIs.

From the period of 1991 to 1999, fishing vessel fatalities in Alaska have demonstrated a downward trend, even though the number of vessel losses

stayed roughly the same. The latter half of the 1990s saw a consistent 50 percent drop in fatalities over the first half of the 1990s [Lincoln and Conway 1999]. During the 1990s, however, not only were fishing training requirements established, but survival equipment requirements were also established. The Pacific Northwest has also seen the greatest compliance with safety training and several organizations still offer this training on the Washington and Oregon coasts.

The question remains however: has safety training been effective in reducing fatalities?

What role if any has safety training played in reducing fatalities? Were people who had safety training at lower risk to be involved in a fatality? What effect has time had between initial training and the time of a casualty on survivability? How could a study answering some of these questions be replicated for others to use? There are many anecdotal stories of fishermen who were helped in an emergency by the knowledge or skills obtained in training. Additionally, it has been observed that there are many fewer vessels lost with all crewmembers, which implies that people are learning how to survive vessel losses. But can this be quantified?

INITIAL PERKINS STUDY

Since a database exists for those trained by AMSEA, and the U.S. Coast Guard maintains a database of commercial fishing casualties (including fatalities and some survivors,) these databases were compared to distinguish fatality rates in trained and untrained groups of fishermen. The USCG originally funded a study in 1995 to examine just this issue in Alaska. This study looked at the 1,518 AMSEA DI trainees between 1991 and 1994, as well as the 159 vessel incidents within that same time frame. Of the 114 fatalities resulting from those incidents, none of the fatalities were AMSEA trained. Of the 343 survivors, 10 were AMSEA DIs from eight different vessel losses. Eight of the 86 vessels that had at least one survivor and none of the 64 vessels with at least one death had an AMSEA DI onboard. The percentage of this happening by coincidence was just two percent [Perkins 1995]. This gave a strong indication that training was having some influence on survivability.

CURRENT STUDY

Five years have passed since the initial study, and it was felt that with the greater number of people trained and the longer time span it would be worthwhile to once again try to quantify the effect safety training was having on fatality rates from the years 1991 to 1999. It is the goal of this study to conduct an ongoing periodic mechanism by which the effectiveness of safety training can be reproduced every four to five years.

In the first study, the criteria of who counted as a "save" was based on a victim basis, not an incident basis. Using a victim basis would not take into account the fact that having one trained DI onboard could have influenced the survival of the other people onboard. Therefore, data was analyzed on an incident basis, and the entire nine-year period from 1991 was examined. The results follow:

From 1991-1999 there were 234 fishing vessel incidents in Alaska investigated by the USCG in which all of the people involved were known.

There were 66 fatal incidents. Eleven of these incidents had at least one AMSEA trained DI onboard. There were 168 non-fatal incidents. Forty-four of these incidents has at least one AMSEA trained DI onboard. This fact alone demonstrates that one would be 1.7 times more likely to survive an incident if there was an AMSEA DI onboard. However, these results are not statistically significant. Further analysis will stratify by time since training occurred to see if this demonstrates significance, and to also determine optimal times for refresher training courses.

In this initial study, we looked at the difference in time between when training took place and the incident occurred. In the Perkins study, this time interval was only 9.6 months. When we looked at data for the whole decade, we found that the average time between AMSEA DI training and a fatal event was 46.8 months. The average time between AMSEA DI training and a non-fatal event was 36.8 months. It is well understood that knowledge and skills deteriorate over time. It is also widely observed that monthly drills are probably not being conducted on a majority of fishing vessels, even if they have DIs onboard.

Currently, there is no refresher training required for DIs, and voluntary refresher training efforts have been disappointing. A lifetime once-only course may be sufficient if survival equipment technology and procedures do not change, but even since 1991 there has been some change in this area. Also, if in fact, as seems to be the case, the majority of DIs are not conducting monthly drills, [Cullenberg 2000] it is likely that there is knowledge and skills deterioration. These would both speak to a need for DI refresher training. From the data on the average time span between training and a fatal incident, it seems that refresher training every five years would be appropriate. This also corresponds very closely to what exit interviews with newly trained AMSEA DIs have noted as being the most recommended time for refresher training.

Since observations have noted that monthly drills are not being conducted on most vessels, there may also be an argument for all persons working on fishing vessels to be required to take a survival course. In this way, emergency procedures and survival equipment use would be familiar to all who work in the industry. More analysis of this data needs to take place before further conclusions are drawn. A known denominator of Full Time Equivalent positions would also give a major boost to analysis. However, it can be stated with certainty that the fatality rate has been significantly reduced in Alaska for a sustained period. Since 1995, the number of fatalities in Alaska has fallen below that of the state's recreational boaters [Hargis 2000]. A replicable methodology has been developed to further research on the effects of safety training.

FOOTNOTES

Cullenberg P [2000]. "Fisheries Observers: Researchers and Guests: Strategies for the Safety of Visitors on Board." Draft of paper presented at IFISH Conference, Woods Hole, Massachusetts,U.S.A. Oct.23-25, 2000.

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FISHERY OBSERVERS, RESEARCHERS AND GUESTS: STRATEGIES FOR THE SAFETY OF VISITORS ON BOARD

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INTRODUCTION

Every year, approximately 350 observers spend over 35,000 days at sea in fisheries in Alaska's Exclusive Economic Zone. Observers are contracted biologists who live and work alongside fishermen on a variety of vessels, such as 75-foot scallop vessels, 80-foot bottom trawlers, 125-foot freezer-longliners, or 375-foot factory trawlers. The vast majority of fishery observers are from outside of Alaska. Most have never been to sea before, and many have had little contact with the fishing industry.

The National Marine Fisheries Service (NMFS), the Alaska Department of Fish and Game, the Coast Guard (USCG), the North Pacific Fisheries Observer Training Center (OTC) and private observer contractors all play a part in the reducing the risk to observers working at sea. The protocols and standards that have been developed may serve as a model to observer programs in other parts of the world, or in other instances when individuals unfamiliar with a vessel or the industry must go to sea.

BACKGROUND

Alaska's commercial fisheries are best described in superlatives - highest volume of catch in the world, most valuable fisheries in the world, carried out in the most inhospitable of conditions. In 1999, Dutch Harbor, Alaska became, for the twelfth year in a row, the port with the highest volume and greatest dollar value of fish landings in the United States. Kodiak, Alaska consistently is in the top five ports in the nation. Over 16,000 vessels ranging in size from 16 feet to 688 feet in length overall participate in Alaska's commercial fisheries each year.

The groundfish and shellfish observer programs in Alaska are some of the most extensive in the world. Approximately 300 groundfish observers spend over 32,000 days at sea each year working on catcher boats, catcher/processors, processor vessels, and shore plants. Observers spend about 90 days at sea, collecting biological and compliance related data mandated by the National Marine Fisheries Service. In a smaller program operated by the State of Alaska, about 50 observers spend over 4,000 days a year observing crab and scallop fisheries in the Bering Sea.

The observer programs in Alaska are also unique in being completely funded by industry through regulation. All vessels greater than 60 feet and fishing in the EEZ must provide observer coverage either 30% or 100% of the time. Vessels pay private observer contractors on a daily basis to provide them with observers. Each year, the industry spends approximately $12 million to cover observer salaries, travel, and insurance.

High risk and mortality also characterize Alaska's fishing industry. Until recently, Alaska had the highest commercial fishery-related drowning deaths in the nation. In the last 10 years, ending in 1999, 120 individuals died in commercial fishing related incidents in Alaska.

Unfamiliar with the job, the weather conditions, and fishing in general, fisheries observers are uniquely at risk. Most are young, recent college graduates, primarily from outside of Alaska. Of 118 new groundfish and shellfish observers trained at the Observer Training Center in 1999, 89% were not residents of Alaska, 60% ranged in age from 20-25 and 68% had graduated with a bachelor's degree in the last 12 months. In many cases, observing is a first career-linked job after school. For example, it would not be uncommon for a

22 year old from Iowa to come to the OTC for two weeks of crab observer training and then board an 82 foot snow crab boat in January, having never been to sea or to Alaska before.

Once onboard, observers work long and erratic hours, seven days a week. Observers are expected to work as the vessel fishes, day or night. On many vessels, sampling takes place in a below-deck factory; on other vessels an observer works on the deck in a semi-exposed environment. Turnover in Alaska's observer programs is high. Approximately one-third of the annual observer population in Alaska is replaced each year.

In the twenty-three year history of the observer programs in Alaska, there has been one observer lost at sea. Robert McCord, from Englewood, Colorado died, along with eight others from a crew of 31, when the Aleutian Enterprise went down on March 22, 1990.

Observers and the personnel on vessels carrying them have different concerns regarding observer safety. Observers need to feel safe doing the job, have confidence that they can get off the boat if it is not safe, and the assurance that there is some recourse for them in the event of injuries.

Fishermen carrying observers want to prevent an accident to an inexperienced observer. They want to be able to protect themselves if an observer is injured. They want assurance that they can seek recourse if an observer feels that their boat is unsafe. And they want to continue to do their job with the observer on board with the least amount of interference.

The stakeholders in the observer programs in Alaska have each contributed a part in developing a system that attempts to make working as an observer safer. The components of this system include **prevention, emergency preparation, and protection** if an accident or injury occurs. Protocols for training, vessel safety inspection and insurance coverage have evolved in an attempt to create a risk-reduced environment for observers.

TRAINING

Safety training for observers in Alaska is done by certified safety trainers either at the University of Alaska's North Pacific Fisheries Observer Training Center in Anchorage or the National Marine

Fisheries Service in Seattle. It lasts one full day, and is hands-on and skill-based in nature.

General onboard safety practices, emergency preparation and response, and survival at sea are covered. New observers learn about common accidents onboard, proper boarding and transfer between vessels, hypothermia, cold water near drowning, man overboard response, maydays, and the seven steps to survival. The lecture portion of the class is followed by a hands-on skills session in a pool or protected open water that includes donning immersion suits and PFDs, entering the water, and boarding a life raft. Trainers complete a five-day Instructor class with the Alaska Marine Safety Education Association before offering the class.

VESSEL SAFETY INSPECTION

Following the passage of the Commercial Fishing Industry Vessel Safety Act of 1988 (P.L. 100-424), vessels have the opportunity to obtain a Voluntary Dockside Examination (VDE) by the Coast Guard or Coast Guard Auxiliary. If they pass the inspection they are issued a Vessel Safety Inspection Decal, valid for two years.

Since a VDE is currently voluntary, the North Pacific Fishery Management Council initiated a regulation in 1998 that made the VDE or some other documentation of compliance with Coast Guard regulations mandatory for all vessels carrying observers. 50 CFR Sec. 600.746 applies to "any fishing vessel required to carry an observer as part of a mandatory observer program or carrying an observer as part of a voluntary observer program under the Magnuson-Stevens Act, MMPA, the ACTA or any other US law." It states "a vessel is inadequate or unsafe for purposes of carrying an observer if…it has not passed a USCG safety examination or inspection."

In November 1999, a groundfish observer noticed that the Voluntary Dockside Examination Decal on his vessel had expired two years earlier. The vessel was allowed to continue to fish only after a Vessel Safety Examination was completed. As a result of this incident, groundfish observers are now required to check that the Vessel Safety Inspection is current upon boarding a vessel.

Observers are also "encouraged to briefly walk through the vessel's major spaces to ensure that no obviously hazardous conditions exist," and to spot

check major safety items such as the presence/absence of life rafts, EPIRBS, and life rings. If an observer feels that he/she would be boarding an unsafe vessel, the observer is instructed to contact their contractor and NMFS. The USCG responds to these situations by coming aboard and working with the vessel to correct problems.

INSURANCE

In Alaska, the vast majority of observers are employed by private contractors who are paid by individual vessel owners or fishing companies. Minimum observer insurance coverage levels were standardized in "observer contractor certification requirements" by NMFS regulations in 1996.

The intent of the current coverage is to reduce the need for both the vessel and the contractor to insure the observer. Observer contractors must provide NMFS with "certificates of insurance" that verify coverage including Alaska Workers Compensation with U.S. Longshore and Harbor Workers and Maritime Employer's Liability attachments to cover "seaman's claims under the Jones Act and General Maritime Law" as well as Commercial General Liability coverage. Worker's Compensation with the maritime provisions covers an observer whether he or she files a maritime or Alaska worker's compensation claim. Commercial General Liability provides contractors with protection against liability and may include a portion that indemnifies the vessel owner from claims.

This level of insurance coverage is substantial compared to that provided to crewmembers in most cases. The industry pays close to $1 million in insurance payments per year. Part of the basis for this wide coverage includes the observer contractor/industry system. Another part is due to a lack of determination whether an observer can be considered a "seaman" for liability cases.

RESULTS

Analysis of whether observers face significant safety problems can be evaluated by looking at an observer's experience after his or her contract is complete. Observers are required to complete a Vessel Survey after each contract that includes questions related to sampling techniques, vessel activities, accommodations, and safety conditions.

An analysis of more than 1,000 Vessel Survey reports from last quarter of 1998 through the first half of 1999 indicated that a large majority of observers experienced no safety problems or accidents. Approximately 18% of the observers reported some safety problems.

Safety problems reported by those groundfish observers covered an assortment of emergency situations including man overboard, collision, flooding, loss of steering, loss of electricity, gas leak, cables parting or other. Figure 1 delineates the categories of safety problems reported by observers. "Other" problems were those not listed on the survey and included such incidents as vessel icing, sanitation problems, sleeping at the wheel and unsafe sampling on deck.

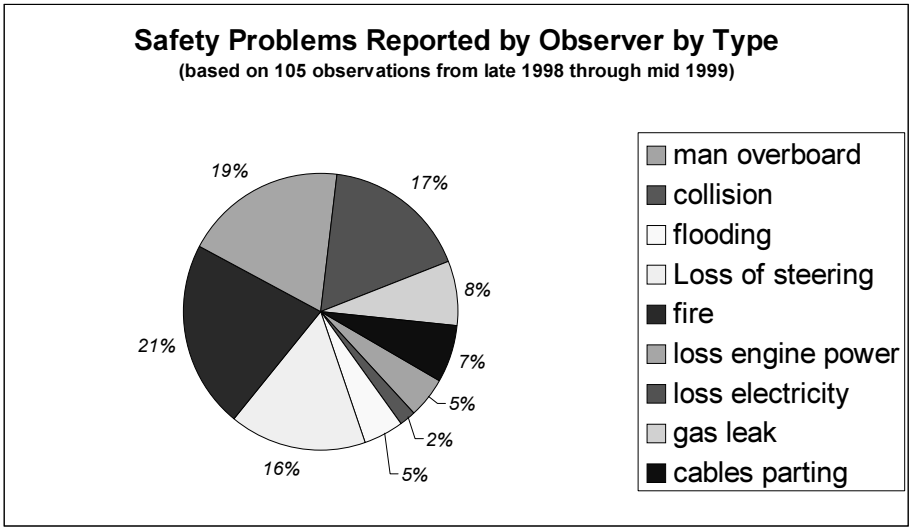

Figure 1: Safety Observations, by Type

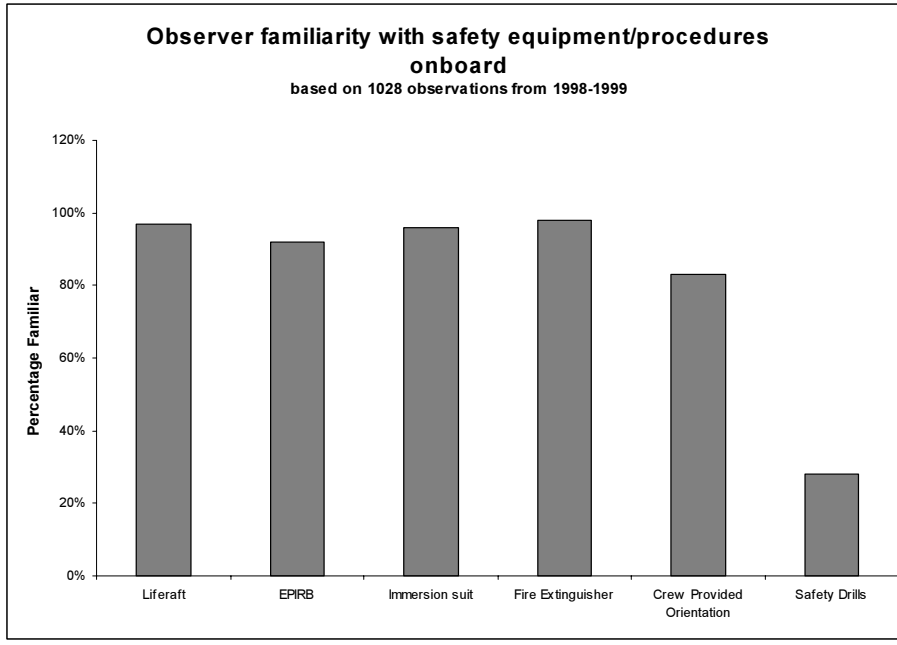

Figure 2: Observer Knowledge

The survey reports found that most observers were familiar with the location of basic emergency equipment onboard their vessels. (See Figure Two) Most reported being given a safety orientation by vessel personnel, although "orientation" ranged from a brief tour of the vessel to a more extensive overview. Of concern, however, were the number of responders who reported that they did not participate in safety drills. Less than 300 out of 1,028 reported that they were given the opportunity to practice emergency skills onboard their vessels.

NMFS Enforcement handles groundfish observer safety problems that are serious enough to warrant investigation. Through 1999 and the first half of 2000, 23 affidavits related to observer safety were completed by observers. (Overall, more than 500 enforcement related affidavits were filed). Approximately one-third of the affidavits related to a vessel having either an expired Vessel Safety Decal or no decal at all. All were pursued by enforcement and were usually fined $500.00. The other affidavits related to a variety of issues such as freon/ammonia leaks, unsafe transfers at sea, stability concerns, asleep at the wheel etc. and in general, were referred to the Coast Guard.

RECOMMENDATIONS

The extensiveness of observer coverage, the high rate of turnover and Alaska's harsh working environment create the potential for a significant number of observer injuries or emergency situations. The safety protocols in place for fisheries observers in Alaska are likely more comprehensive than other programs in the world given the variety and size of the observer programs. Indications from the observers themselves are that most are able to perform their jobs safely and experience minimal safety-related problems.

However, examining the completeness of the protocols in providing prevention, emergency response and support, led to three conclusions. First, observers, many of whom have little background on vessels, are asked to be the judge of their safety. How can an observer be expected to "feel safe" when he/she does not really know what a safe situation is? Do we provide adequate training for observers to make those judgments? Is the VDE the best or only tool that should be used by observers upon boarding a vessel?

Observers, by not participating in drills or a defined "orientation" do not necessarily get the preventative training or emergency response background that they need on a particular vessel.

Second, the emphasis in training and in vessel requirements is weighted toward post-event situations. A small portion of Alaska's fleet is mandated to provide safe sampling stations for observers. Most vessels are not, leaving observers to work in a variety of corners of the deck or factory.

The following recommendations to the current practices may reduce risk to observers further.

Work with industry to improve sampling stations for observers. A small component of Alaska's groundfish fleet are required, by regulation, to provide a designated observer sampling station with proper lighting, enough room to work, and tables at correct height, among other things. Observer programs should continue to work with industry to provide safely designed observer sampling stations in more fisheries.

Ensure that training focuses on pre-event as well as post-event activities. In the last year, training has encompassed prevention more

extensively, such as avoiding sleep deprivation and back injuries. This prevention aspect of training should be incorporated more fully in the future, based on observer reports of injury and other sources about safe fishing practices.

Require refresher safety classes for experienced observers. Once an observer has completed his or her initial observer training, no further skills-based refresher training is required or available through the programs. Safety is mentioned in annual refresher short classes required of groundfish observers, but no pool or practical lessons are included. Shellfish observers are not required to complete any annual reviews and do not receive any refresher training in safety skills.

The majority of observers do not participate in safety drills while onboard the vessel. As a result, very few observers have the opportunity to perform the skills needed in an emergency situation beyond their initial training class. Many federal and state employees who work at sea on an infrequent basis are required to participate in annual or biannual skills-based safety classes. Observers could also be required to maintain an annual or biannual "safety at sea" certification.

Require observers to enter safety check documentation in their logbook. Observers are trained to check for current documentation of a vessel's compliance with US Coast Guard safety regulations and are "encouraged" to spot check safety gear themselves. Currently, observers are not required to document their safety check. Observer logbooks could contain an area to record the date that the Vessel Safety Decal expires as well as documentation of a safety-orientation and gear check. This would elevate an observer's safety check to a "required" rather than an "encouraged" activity. Defining the scope of a safety "orientation" for industry members would ensure more consistency for observers.

Work with the Coast Guard to improve compliance of fishing vessels with drill requirements. A safety "orientation" for an observer can vary widely in comprehensiveness. It also does not provide an observer with a sense of the "safety culture" on board that particular vessel. Participation in drills would give observers a chance to familiarize themselves with the dynamics of the crew and the procedures on board.

Observers may be placed on a vessel that has only 30% coverage and thus, has missed a recent drill. On the other hand, safety drills are not held regularly on every vessel, and so, observers as well as crewmembers do not have the opportunity to practice emergency skills. Compliance with safety drill requirements, in itself, may be a measure of the importance of safety on that particular vessel.

Establish the status of an observer for insurance claim purposes. Determination of whether or not an observer is a "seaman" has the potential to save considerable money for industry, as well as simplifying liability claims for observers. That determination may take a judicial or legislative determination.

Demand for observers is growing worldwide. In many cases, observers go to sea on vessels that are not as safety conscious or as well regulated as those in Alaska.

Ensuring a risk-reduced environment for observers and others who are infrequent members of a vessel's complement requires recognition by both the observer and the vessel's crew that inexperience can create unique safety concerns. Focusing on preparation before departure and ensuring that an observer is traveling on a safe vessel are paramount in reducing risk. Supporting observers if an accident or injury does occur is critical in maintaining and valuing a strong observer corps.

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SAFETY TRAINING FOR ICELAND'S FISHERMEN

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Iceland bases its livelihood on fisheries and 95 percent of the total seafarer population in Iceland are fishermen. Naturally, the national authorities are concerned about the working environment of seafarers as well as of the performance of this important industry.

In 1999, the fishing fleet consisted of a total of 2000 vessels, with 1500 under 12 m in length, 220 between 12 and 24 m, 180 between 24 and 45 m and 100 over 45 m. The estimated number of seafarers on those vessels is approximately 9,000.

The accident and mortality rates among seafarers have been very high, as this field of work rates among the most hazardous today. The authorities have found the situation to be unacceptable and in 1985, a parliamentary committee was established with the objective of finding ways to reduce the number of accidents at sea and to increase the safety of seafarers. Following a resolution of the committee, the National Life-Saving Association of Iceland (now Icelandic Association of Search and Rescue, or ICE-SAR), together with interested parties, decided to establish a safety-training

center for seafarers with the principal objective of increasing their knowledge on safety issues.

The establishment of the training center, the Maritime Safety and Survival Training Center (MSSTC), marked the beginning of a new chapter in the safety affairs of Icelandic seafarers. Upon its establishment, the authorities proved their support by selling a coast guard vessel to the NLAI for ISK1,000 (approximately $9.70 U.S.) for the new center. The vessel, which was given the name *Saebjorg*, was converted into training vessel. It housed the MSSTC, whose role is to educate seafarers in safety and survival on board ships, as well as provides general education on accident prevention at sea.

A reduction of accidents can been seen in figures showing reported accidents to the Social Security Fund every year. This group contains both minor and major accidents, as well as accidents involving trips from the ship to home and back again. They comprise about ten percent of the total figures.

From its beginning, there has been strong interest in Icelandic seafarers about the Training Center, and from the start its programs have been very well attended. Having a safety-training center on board a ship facilitates bringing the courses to the seafarers in areas outside of the capital city, and contributes to the high attendance rate of the Training Center. Since its establishment, the MSSTC has steadily grown and the number of courses offered has increased. Today, the Center offers 14 different types of courses for seafarers, with the Basic Survival and Fire Fighting Courses being most popular. In collaboration with the College of Navigation in Reykjavik and the University Hospital in Reykjavik, the MSSTC has organized refresher courses in medical care on board ships, according to the Council of Europe's directive no. 19/97.

The Icelandic authorities have always shown much interest in and given much support to the MSSTC. The year 1990 saw the passing of a law on the Training Center, securing its financial foundations by allowing an annual allocation from the national budget. Additionally, the Center has an agreement with the authorities on safety training for all Icelandic maritime schools. In 1994, the authorities decided, through a law amendment, to obligate all Icelandic seafarers who are to be registered for service on Icelandic vessels to undergo safety training before being permitted to work at sea. The act on the registration of seafarers applies to all vessels sized 12 GRT or more. According to the

act, all crewmembers must be registered with the authorities before a vessel leaves port. Today, this system is nationally computerized, and is a very effective control system in terms of the seafarers' certificates and their safety training.

In 1998, the Government of Iceland decided to give a ferry, which was to being taken out of service after a construction of an underwater tunnel on the ferry's regular sailing route, to the training center for replacement of the older vessel. The size of the ferry, which was owned by the state, is about 50 percent greater than the old training vessel. The new vessel was handed over to the MSSTC in July 1998. Conversion on the training vessel, which has given the same name as the predecessor *Saebjorg*, was made and the first course started in October 1998. To run a training center for seafarers onboard a ship allows for the possibility to take the training center to the seafarers along the coast. The MSSTC's training vessel has made calls at every seagoing port around Iceland, providing training programs that have made it possible for seafarers and owners to minimize the cost of transport and accommodation for the crews while attending courses.

The input by the Icelandic authorities in promoting safety at sea and finding ways to decrease the number of accidents at sea is invaluable**.** From the date of its establishment, a total of 15,000 people have attended the various courses of the MSSTC. It is anticipated that around 600 fishermen have not yet attended Basic Survival and Firefighting Course. By the end of March 2001, all Icelandic seafarers should have received safety training. However, many of them received it as far back as 15 years ago. This is why the Icelandic authorities included a provision in the act on the registration of seafarers authorizing the relevant government minister to implement a requirement on seafarers, obliging them to re-train in five-year intervals. It is hoped that this option will soon be exercised.

The ICE-SAR, on behalf of the MSSTC, is a member of the International Association of Safety and Survival Training (IASST). This is a venue in the exchange of expertise and knowledge pertaining to the safety training of seafarers and thereby ensures that the training is in accordance with the most stringent demands. The Icelandic Maritime Safety and Survival Training Center has repeatedly proved its importance as a large number of seafarers have stated that the training they received at the Center saved their lives in hazardous

circumstances. The best thing would be, however, for us to be told that nothing happened as they, the seafarers, have received safety and preventive training. For us, good news would be no news.

EFFECTIVE TRAINING PROGRAMS FOR FISHERMEN INVOLVED IN SPILL RESPONSE

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Mr. Kadow is a life long Alaskan with a background in marine emergency response issues. He's been involved in the development and instruction of safety training programs for fishing vessels involved in oil spill response for the past twelve years.

He is currently the Safety and Training Coordinator for Alaska Clean Seas, the organization tasked with spill response and training for the North Slope of Alaska. Prior to joining Alaska Clean Seas, he worked training fishing vessels in emergency response in Prince William Sound as part of the efforts stemming from the Exxon Valdez Oil Spill.

While oil spill incidents have declined over the past decade, increased awareness by regulatory agencies, shippers, facility operators, local, state and federal governments and most importantly, the public, has brought sweeping changes to the response industry. New U.S. regulations such as the Oil Pollution Act of 1990 (OPA 90), which came about largely as a result of the Exxon Valdez oil spill, amended the Federal Water Pollution Act to require tank vessel and facility response plans in order to better prepare the owner of a vessel or facility to respond to an oil or hazardous substance release. OPA 90 required that in addition to identifying response equipment and methods, operators must also provide response training and exercises to both employees and private response personnel.

The National Preparedness for Response Exercise Program (NPREP) was developed to establish guidelines to satisfy the OPA 90 exercise requirements. This program provides general descriptions of the types, frequency, and size of the various training and exercise programs needed to be in compliance with the OPA 90 requirements. It is not a strict guideline, but rather provides minimum standards for ensuring adequate response readiness. Many facility and vessel operators exceed the minimum standards.

In addition to OPA 90 regulations, the Occupational Safety and Health Administration (OSHA) requires that personnel employed in hazardous substance response and clean-up operations be trained to recognize the hazards and understand the protective measures available to them. These regulations are outlined under 29 CFR 1910.120, commonly called the HAZWOPER regulations. Additionally, employers must comply with federal requirements identified in 49 CFR parts 172 and 176, which again provide guidance to employers on the training of employees in handling hazardous materials. All of this adds up to a comprehensive program for fishermen's participation.

These regulations and guidelines apply only to those programs located in the United States. However, in many parts of the world, there are similar programs as governments, industry, and the public recognize the need for regulations to provide measures to ensure that we do everything we can to protect the largest and most delicate ecosystem on the planet; our oceans, rivers, and streams.

Largely as a result of these regulations, many opportunities have arisen where the use of fishing and other vessels to assist with prevention and response to marine spills have become necessary. Some of these efforts did not go well. The partnership between industry and fishermen may have been developed after an incident, when tensions are running high, program priorities are vastly different or the cost of developing a program may have proven prohibitive. Many efforts faltered because industry did not recognize the contribution that fishermen could provide to the response. Issues such as where the oil is going, where isn't it going and why, identification of environmentally sensitive sites such as spawning and fish transit areas, bird nesting sites, clam beds, and the vessels' capabilities, were often overlooked in the response. On many occasions, fishermen have proven the best computer modeling of spill trajectories wrong by simply saying, "Come with me, I'll show you." Response efforts have been shown to be more successful when fishermen had input to the planning process prior to the emergency. Issues such as current modeling, seasonal site sensitivities and availability and capabilities of vessels as well as general local knowledge of the area all have contributed to minimizing the impact of a spill.

Times appear to be changing as more and more vessel programs are being developed. History has shown that the cost of having a program in place prior to an incident is far less expensive than having to put one in place after a spill.

Delays due to lack of resources or knowledge of response issues only add to the confusion. Groups of qualified responders are being formed, and heightened awareness of the benefits of a vessel program have prompted many shippers and petroleum organizations to refine response plans to include fishing vessels as part of their response capabilities.

While fishing vessels comprise the majority of available response vessels, there are a number of uses for other types of vessels of all sizes. From small skiffs to large tour boats and ferries, a marine response will not be effective without the use of a well trained marine fleet. Many operators of marine terminals and pipeline operations located near water have boats in their response inventory. However, they often do not maintain all that would be needed or have enough qualified operators to staff the fleet during an emergency.

The following examples are typical of the types of vessels and the activities for responder participation.

Seiners and their jitneys

Used for deploying and towing oil spill booms in containment, deflection and exclusion booming activities.

Operating a variety of skimming and other recovery systems, transporting small oil recovery barges, and basic work platforms.

Handling oily waste and freight delivery.

Bow Pickers

Deploying and towing containment boom and working in shallow waters to assist beach crews.

Anchoring activities, shuttling light duty equipment such as small pumps, sorbents and other nearshore equipment.

Transporting oily waste bags to larger vessels.

Landing Craft

Used for a wide variety of functions from beach support for shoreline clean up operations, delivery of large amounts of boom and other supplies, fueling the marine fleet, waste handling and general staging platforms.

Fish Tenders

Waste handling, transporting recovered oil tanks, crew and equipment support such as refueling, repairing response equipment, and refrigeration needs.

Skiffs and Small Craft

In many situations, these vessels are the most important of all. Their ability to work in shallow areas allows them to do a variety of tasks.

Beach clean up work, shuttling responders and equipment from larger vessels, wildlife hazing and transport and anchor monitoring are just a few of the tasks they accomplish.

Tour Vessels

Used for command and observation platforms, crew transport, meal and rest stations, and supply vessels.

Ferries

Based upon the size and type, ferries can be utilized for crew berthing, personnel transport, observation platforms or refueling stations.

Car carrier versions can transport equipment and act as accumulation points for both oily waste and other disposal needs

The following are some of the key topics that should be included in a training program for vessels operators and crew.

REGULATORY REQUIRED TRAINING

HAZWOPER training may range from 8 to 48 hours depending on the type of activities the responders will be involved in, the level of work hazards they encounter, and the chemical hazards associated with the spilled product.

Hazardous Materials Transportation and Shipping (HAZMAT) training is required for those responders involved with the packaging and transport of hazardous substances. The U.S. Coast Guard license issues may come into play in certain situations where vessel operators are transporting passengers for hire or operating larger vessels. There are many other situational training requirements that may come into play but these are the primary regulatory requirements.

SAFETY AND HEALTH

Critical issues to review are the safety and health hazards associated with the incident, specifically, the tasks that the fisherman will be performing. Understanding the personal protective equipment, safe work practices, and decontamination procedures that are required ensures that personnel are not exposed to chemical hazards. Issues regarding confined spaces such as fishholds, tanks and temporary storage devices should be reviewed. Temperature related injuries such as heat exhaustion, hypothermia, and frostbite need to be addressed. Excessive noise, eye exposure, respiratory protection, and prevention of slips, trips and falls are always an issue as these are often new activities for fishermen and they may not be as familiar with the safety hazards associated with oil as they are with fishing. Other issues such as vessel stability, lines under tension, crushing hazards and crane safety are more familiar to fishermen, but merit attention.

FATE AND BEHAVIOR OF OIL

Understanding the physical, chemical, biological, and climatic conditions that effect the fate and behavior of oil in the marine environment will give the responder a better understanding of how they effect response priorities and equipment selection. Responders must have the ability to adjust their activities according to how the product changes while in the environment. Persistent oils such as crude oil, bunker oil, and lube oil do not have the evaporation qualities of a gasoline or jet fuel. Spreading and transport factors such as tides, current, sea state, soil make-up, and wind can all dramatically increase the area of the spill. There are many cases where a spill was under control until the wind came up and drove the oil into marshes, onto beaches, or further out in the bay. Suspended sediments in the water can act as binding agents, causing the oil to become heavier and sink below the surface. Oils that come in contact

with sandy beaches will form heavy tar balls that stay in the intertidal zone or migrate out into nearshore areas. This presents responders with a new set of challenges as a beach may be contaminated numerous times, requiring a beach clean-up team to re-visit the site.

RESPONSE MANAGEMENT

OPA 90 requires that the responsible party have a management program in place for emergency response. This is often referred to as the Incident Command System or Response Management Plan and involves a prescripted organizational structure for management of all phases of the incident. It can vary from area to area but addresses issues such as the organizational structure, common terminology, manageable span of control, and comprehensive resource management. Understanding how the fishermen and their vessels fit in to the plan, their activities, reporting procedures, their communications responsibilities, what form of contract exists between the responsible party and the vessel owner are all factors that must be identified early on. The Incident Command System is designed to have many of these things in place prior to the incident so that activation is the issue, not education. Knowing ahead of time what your duties are and where you will be performing them reduces the time lost to confusion.

RESPONSE EQUIPMENT

Fishermen are renowned for their ability to improvise in an emergency. After the response is underway is not the time to try and figure out how to operate or deploy response equipment. Much of the equipment is similar to the types of equipment used in their day to day job but may have peculiarities that make it important for fishermen to understand the operations and conditions in which to use the equipment.

Spill containment booms behave very similar to nets while being deployed. They typically come off drums or peel off the deck as the vessel moves forward, they have floatation and ballast, and react much like a net while being towed into position. But like a net, they can suffer catastrophic damage if not handled properly. Understanding how to tow a boom in a certain configuration and what characteristics it has, determines how effective it is in containing oil.

Powerpacks that operate skimmers and other systems are largely like the hydraulics on a vessel and in many cases, the vessel's own system may be utilized. However, if not used properly, they will be ineffective and the recovery of the oil will decrease significantly. A hydraulic system put out of service due to an operator's unfamiliarity with it, means no oil is recovered until it is back in service.

Anchor systems are a critical piece of equipment in spill response. Understanding the method and reasons for setting them in certain patterns or having to set anchors in areas that vessels normally wouldn't anchor in may mean the difference between a successful response and a failure.

The inability to deploy, properly position, and operate response equipment means that oil initially contained may escape containment, creating additional impacts to the environment.

RESPONSE OPTIONS

There are four primary options for response to marine spills: mechanical recovery utilizing containment boom, skimmers, and storage tanks, in-situ burning, dispersants and monitoring. Due to the regulatory atmosphere in the United States, mechanical recovery is the primary response method. In other parts of the world, burning and dispersants play a larger role and monitoring is used when the activitites associated with responding may create greater environmental impacts than if it were left alone. It is important to remember that these responses are all "tools in a tool box."

Certain methods work better in situations than others. Certain areas place higher emphasis on one method over another, and no one solution works in all cases. With mechanical recovery, it is not unusual to have large amounts of resources such as personnel, vessels, and response equipment dedicated to the effort. Vessels involved in burning and dispersant activities have specialized training needs that should be addressed in advance.

RESPONSE OBJECTIVES, STRATEGIES AND TACTICS

Marine responses are essentially grouped into four categories: Open Water, Nearshore, Rivers/Estuary, and Onshore. The methods for responding in these environments share some common issues and equipment, but the environments

are different enough that understanding the methods and goals for them must be understood by the responders in advance. Weather, tides, current, amount of oil, and degree of sensitivity are taken into consideration when establishing the response priorities. The responders must have a clear understanding of their assignment prior to deploying equipment. Objectives are like goals, they are broad in nature and do not provide information on the method by which they will accomplish them. Strategies define how we meet our "goals" and tactics describe the method to be used. Fishermen involved in the response work primarily with strategies and tactics. They are in the field, deploying the equipment and working to accomplish the objectives. The objectives, strategies, and tactics should be re-examined regularly as the incident progresses and will often change to reflect conditions in the field. Understanding them ahead of time, being able to anticipate the changes, communicating the situation in the field to the response managers, being familiar with the equipment needs, and the methods for employing them are all critical to the success of the response. Responders must be aware of the various ways in which the vessels they work on, and the tasks assigned to them, are utilized if the response is to be successful.

All of these factors add up to a comprehensive program for fishermen's participation. In many areas around the world, large fleets of fishing and support vessels are actively involved in programs, but more training and exercises are needed. Training and exercises cannot be a one-time experience. Training and exercises must be conducted on a regular basis. New techniques and equipment are coming available all the time and they can only be evaluated by using them in a variety of conditions. Fishermen have both an economic and emotional attachment to the seas. Therefore, they have an enormous stake in the success of response efforts and need to be involved in the process at several levels. From the first step in identification of priority protection sites, through additional steps ensuring that vessels and equipment are properly matched to the task, and insisting on quality training, fishermen are at the core of an effective response program.