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LATE BREAKING PRESENTATIONS



Photograph and caption by Earl Dotter

The groundfish catch of haddock, pollock, cod, monkfish, hake, and flounder is released from the net after a four to five hour trawl. The First Mate, on the left, controls the winding of the net as the deck hands release the catch.

CHALLENGE AND OPPORTUNITY: OCCUPATIONAL HEALTH AND SAFETY “ON THE EDGE” EVALUATION AND INTERVENTION STRATEGIES FOR FISHING AND FISH PROCESSING

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Since joining Acordia in 1990, Andy has worked extensively with maritime clients, and has become well known in the industry for his work with fishing vessels and floating seafood processors. He worked as the full-time safety director for a major offshore processing company for over three years, spending several months at sea in remote locations while designing and implementing a comprehensive safety program. He has presented popular seminars at statewide and regional seminars and conventions.

INTRODUCTION

Commercial fishing and offshore fish processing are among the most hazardous occupations in the world. The often adverse environmental factors, and the nature of the work itself combine with the independent spirit of these workers “on the edge” to create a volatile mix that results in thousands of disabling injuries and fatalities every year. Injury and fatality rates in this industry are up to ten times higher than land-based “high risk” occupations.

In Alaska, as in other parts of the world, this work is often performed in hazardous settings; the hours are long, and the work itself physically brutal. Yet from an accident prevention standpoint, this work is not so different from other jobs. Physical laws still apply; people act in safe and unsafe ways; and the working environment intertwines with the human element to create challenges for occupational safety and health professionals. Even this most demanding

industry is amenable to the accident prevention techniques that have been successful in other industries.

This paper summarizes my initial experiences as the safety director for a major Alaska based fishing and fish processing company in the early 1990s. Charged with a reduction in accident levels that were threatening the continued existence of the organization, I spent many months at sea in remote locations evaluating the situation, and then designing and implementing a comprehensive safety program.

Loss exposures were evaluated via on-site studies, and injury/fatality data analysis. The overall reportable Incidence Rate (the number of reportable injuries over the course of a year per 100 full-time equivalent employees) was 119; in one division the incidence rate was 245. This meant that each 100 employees were incurring 245 injuries over the course of a year. By way of reference, a “high risk” land based company might have an incidence rate of 10 or 15.

Loss prevention methodologies and intervention strategies were developed based on interviews with line employees and company management, as well as workflow and process analysis. An intervention priority matrix was developed that incorporated weighted frequency and severity factors. This matrix was used to target loss prevention assistance to those facilities with the greatest need of improvement.

Employee and supervisory training modules were developed to address the identified loss exposure areas, including environmental, machinery, and process hazard (ammonia refrigeration). Special attention was devoted to life safety at sea and emergency preparedness/response. Initial orientation was developed for new employees and recruitment efforts were refined with the aim of selecting and retaining most qualified applicants.

The incident rate was reduced from 119 to 55 over a two-year period, and direct workers compensation costs were reduced by 26 percent. Another measure of program success was the effective response of the well-trained crew when a disastrous shipboard fire occurred aboard a floating processor three years into program implementation.

This paper focuses on recognition of common loss exposures, and on development of countermeasures to reduce incident frequency and severity.

The emphasis throughout is on accident factor “theme recognition”:

Safety and health are management issues, and they are manageable.

That accidents in the marine environment do not just happen; they have definite causes.

That a properly educated and motivated management staff can prevent these accidents. The key is recognition and correction of the unsafe behaviors and conditions that cause “accidents”.

One final point by way of introduction: although the events discussed in this paper took place between six to ten years ago, my work in the fishing and seafood industry has continued. My experiences have led me to conclude that the risk factors are much the same in 2000 as in 1990, and that those risks are still unacceptably high. Unsafe human behaviors in an environment very unforgiving to any error, were the root causes of accidents in 1990, and they are the root causes in 2000.

Progress has been made in some areas, particularly in vessel maintenance and inspection activities (engineering). But the fishing industry still carries a heavy burden of death and injury, and much more work remains to be done, especially in the realm of human behavior.

Thus the challenge, and the opportunity.

COMPANY BACKGROUND AND OPERATIONS

The company was engaged in the harvesting, processing, and wholesale marketing of crab, roundfish, (including salmon, pollock and cod), and flatfish such as sole. Several catcher boats were operated as well as oceangoing or “floating” processors, and shore plants. This was one of the largest American seafood companies, with over 500 employees processing more than 150 million pounds of product per year. The total number of employees averaged between 450 and 550.

The company was in an aggressive growth mode, but profits were being undermined and future growth threatened by mounting workers compensation losses. By 1990, workers compensation and associated costs had skyrocketed to nearly U.S.\$2 million per year. It became clear that the loss control service traditionally provided by the insurance industry would no longer meet the needs of the company in this area. A decision was made to hire a safety director on a project basis.

EVALUATION

The first phase of the project was a thorough evaluation of the status of the company's safety program. This process consisted of an examination of current and historical loss data; and the major exposures to loss, and the effectiveness of existing control measures.

An accurate needs assessment was essential to maximize the limited financial and human resources available. In order to establish measurable and realistic goals, we first had to determine a baseline reading of the safety program.

The primary tools for gauging program effectiveness were data analysis, and manager and employee interviews. Anonymous surveys as well as informal conversations were used to develop information. These conversations provided a wealth of information about company and industry attitudes and procedures.

The fishing industry historically has been an occupational safety and health backwater. A "last frontier" mentality has been the norm, and the attitudes engendered by this mentality, combined with a high paced production ethic, have resulted in the high occupational injury and illness rates referenced above. Other contributing factors were the virtual absence of government oversight and the lack of commercial insurance industry assistance.

When I began evaluating these workplaces, colleagues in the safety field had said that I wouldn't be able to imagine the conditions on a floating fish processor until I actually saw them, and they were right. A full exposition of the physical conditions and problems I encountered at each facility is beyond the scope of this paper. Suffice it to say, I was shocked at the condition of vessel "X," and the complete lack of any safety program or procedures. Machinery was unguarded; personal protective equipment either not used or not present at all; safety training, even in the simplest form, was non-existent. And the

condition of the vessel itself was appalling. The decks were slick as ice, uneven and corroded due to old fire damage, as well as from poor drainage, surfacing and housekeeping. And from the chipping paint in processing areas, to the gallows humor of the crew, the vessel exuded a forgotten, foreign legion atmosphere.

We learned from interviews that some managers were concerned that incorporating safety into their operations would adversely affect the production ethic of the company. Involving employees in the safety program might open a Pandora's box full of attitude and morale problems. Industry perceptions about "safety" and "production" that had been shaped over many decades would not be changed overnight. For instance, the idea that safety and production are mutually exclusive was central to the mindset of many in the seafood industry. One of my priorities was to educate these managers about the true impacts of accidents upon the organization, the tangible costs of work related injuries. I also tried to illustrate the intangible side of this equation: that the true productive capacity of the company would never be realized until safety was proactively managed.

Workers with whom I spoke broke evenly into two distinct categories. Those who had prior experience in the seafood industry said that the company was about average in its approach to worker safety and health. Those without prior seafood experience were, like me, shocked by the conditions and attitudes present on the vessels.

ACCIDENT AND INJURY DATA ANALYSIS

An evaluation of the data revealed that the *accident types* could be categorized into the following groups, accounting for over 80 percent of all incidents: slips and falls; struck by and against; and overexertion/repetitive motion incidents.

These accidents produced the following *injury types*: strains and sprains; contusions and lacerations; and crushings and amputations.

Most accidents involved workers who were injured individually, although there were several catastrophic claims with more than one injury arising from a single incident.

The remote location of the vessels made each accident a potential disaster. With modern medical facilities many hours and sometimes days away, even “minor” injuries had a major potential. This factor also added significantly to the cost of injury treatment; a medical evacuation flight from the Aleutian Chain to Anchorage could run over U.S.\$25,000.

ACCIDENT CAUSATION

Industrial accidents are the result of unsafe human behaviors and unsafe conditions. Most experts agree that more than 85 percent of all accidents result from unsafe human behavior; indeed it can be argued that even those accidents that result from unsafe conditions (e.g. wet or slippery deck, poor weather, etc.) have a human component or interaction that creates or worsens the exposure. A storm in the Bering Sea is not inherently dangerous. It becomes a threat to people only with the addition of people; often in the form of a poorly trained or equipped crew, or in the form of a vessel in the wrong place at the wrong time – the result of poor judgement.

That human behaviors and errors cause accidents is beyond argument. The reasons that people act unsafely are open to question, but my experience leads me to assert three broad categories of causation:

LACK OF KNOWLEDGE

Virtually every accident that I investigated was caused at least in part by a lack of knowledge. Training for new employees and supervisory personnel was therefore the highest priority in our action plan.

IMPROPER ATTITUDES

Sometimes people act unsafely even when they know better. This causes accidents that I group under the “attitude” heading. Examples of this type are employee shortcuts, failure to follow established procedures, etc.

PHYSICAL LIMITATIONS

Humans have physical limits. Nowhere has this been more apparent to me than in the Alaska fishing industry. There, people are regularly pushed to and beyond their limits in the name of production and profitability. The simple

physical fatigue that results from working 16 hours per day, day after day is a major factor in most accidents in this environment.

These factors are present to some degree in any industrial setting, but they are distilled and enhanced – and their impact is magnified – in the offshore work environment. This environment is very unforgiving to errors of any type.

The emphasis on human behavior is not meant to minimize or to deny the impact of environment or physical conditions. The physical conditions present in the fishing industry are undeniably harsh and at times seem to conspire against safe work activities. The cold and wet environment, a moving platform, and physical isolation from help in an emergency are a few of these factors. The severe work environment pushed every element – human and mechanical – to the limit.

Finally, as in all other work settings, accidents can be viewed as a symptom of management failures. Frontline supervisors often complained at the relative disparity between their responsibilities and their authority – they said they lacked authority or backing from higher level management to make needed changes.

DEVELOPMENT AND IMPLEMENTATION OF ACTION PLAN

The initial risk control evaluation of the company had revealed several significant areas of weakness that would have to be addressed. I grouped these into two broad categories, administrative and operational. The administrative recommendations dealt with program, personnel, and training elements. Operational elements referred to condition-related recommendations such as machine guarding and chemical safety specific to a particular vessel or location. Since the operational recommendations dealt with vessel-specific physical conditions, only the administrative issues are explored in this paper.

A detailed action plan was developed and submitted to management. This plan included a prioritized implementation timetable.

I have found that troubleshooting an organization and developing an action plan are the easy parts of the job, relatively speaking. *Implementation* of the plan and integration of the elements into production activities are far more

difficult. The implementation and integration process takes time, commitment, and a dedication of resources. Viewing safety, like quality assurance, as an integral cycle and an ongoing process makes the inevitable bumps along the road easier to take.

ADMINISTRATIVE

The major administrative recommendations and action steps were:

a.) Demonstrate management commitment to safety. Top management needed to convince both skeptical employees and supervisors that they were serious about safety. This was accomplished in a number of ways. First was in hiring a safety director and making budget resources available. Next was backing the plan that was developed to address shortcomings, including training, upgrading machinery and facilities, etc. A financial incentive plan was approved for line supervisors and employees. And finally, managers needed to “walk the walk”: set a good safety example in their own behavior.

b.) Initiate accident prevention training for all company supervisors. Front line supervisors are the most important actors in the organizations’ safety program. They are the only people that are in position to observe and correct the unsafe behaviors and conditions that cause accidents before they result in injuries to employees. But they cannot perform their role without knowledge. Hence, training these people in accident factor recognition, and in general management techniques is critical to long-term success. My constant mantra was, and is: *The Safety Manager Is Not Responsible for Safety – Company Management Is.*

c.) Initiate employee training. As noted previously, lack of knowledge is a major factor in most industrial accidents. The corrective action for this is training. Initial orientation and job specific training was developed and delivered to all employees. Employees were trained in the typical industrial areas (lockout/tagout, material handling, accident reporting, etc.,) as well as in areas unique to shipboard life and seafood processing (area evacuation and abandon ship procedures, ammonia emergency response, etc.)

d.) Develop a written safety procedures and operations manual. Standardized policies and procedures were developed that ensured corporate baselines

were met while still allowing for management flexibility in meeting goals. This manual also served as a reference guide for the Plant Managers and Safety Coordinators.

e.) Designation of a “Safety Coordinator” for each vessel and location. It became obvious early on that the Plant Managers were overloaded with existing responsibilities. Indeed the entire management structure of the company was very lean. Managers knew they were responsible for safety, but didn’t have the time or the resources necessary to do that part of their job. Part of the solution here was a re-ordering of priorities by top management that occurred under paragraph “a” above. The other part was hiring a safety coordinator for each location (or designation of an existing employee as coordinator). The Plant Manager was still responsible for safety results – we made it clear that the Coordinator was a resource person that was there to assist the managers in their safety responsibilities.

f.) Develop improved personnel screening, hiring, and retention procedures. One factor that came up repeatedly in employee interviews was that many employees felt they were not well informed about work and living conditions during the recruitment process. The oft-repeated phrase was “I didn’t know what I was getting in to.” There was also ample anecdotal evidence that poor morale was a factor in many workers compensation claims.

Therefore improving the information flow to potential applicants and refining employee selection procedures became top priorities. One of our first projects was what I termed our “de-cruitment” video; a realistic portrayal of actual conditions in the plants and living quarters that was shown to each group of prospective applicants. This video, along with other measures, had the desired effect – a dramatic reduction in complaints associated with poor morale and fewer “problem” workers compensation claims.

We also instituted universal pre-placement physical screening. Because of the hard physical nature of the work, this was a very valuable tool for both employer and employee. These exams made it possible to base work area assignments on objective data.

RESULTS

The safety process that was initiated resulted in a significant improvement in the company's risk management and safety profile. There are several different standards available to measure an organizations' safety progress: comparison with shore-based industries, other offshore processors, etc. Perhaps the most meaningful is measuring the company against its past performance. By this standard, great strides were made both in the short term, and over the longer course.

A safety program was developed and implemented literally from the ground up. We were successful in raising the safety consciousness of the top management and supervisors of the company. And we instilled an awareness of safety into the operational and "production" dynamics of the company.

As noted above, the workers compensation Incident Rate (the number of reportable injuries over the course of a year per 100 full-time equivalent employees) was reduced from 119 to 55 over a two-year period, and direct workers compensation costs were reduced by 26 percent over that time. Those figures reflect overall company experience; the reduction at some of the "problem" plants was far more dramatic. One location had an incidence rate drop from 246 to 67 over the same two-year period. Costs were reduced by over 75 percent at that location.

In addition to direct workers compensation savings, the implementation of the safety program produced many collateral benefits. Among these were:

- Reduced employee turnover (and reduction in associated costs);

- Improved product quality (resulting from more experienced and better trained work force); and

- Improved relationships with regulatory agencies.

The bottom line was literally a better bottom line – increased profitability.

CONCLUSION

The progress has been painfully slow at times. It was clear that procedures and attitudes built up over decades were not going to be changed overnight — or even in a decade. Some of the underlying causes of the high injury rate among seafood processors seem destined not to change at all, or at least in the foreseeable future. Things such as the relatively low pay and long hours (up to 18 a day), that make it difficult to attract and retain educated and qualified workers.

In spite of those challenges, I am optimistic about the future. My optimism stems from success stories like those related above, and from others I have been involved with since then. I have seen at first hand the difference that safety training can make.

The defining moment of my 20 year safety career (thus far) came in 1994. A horrific fire broke out on a processing vessel in a remote area of the Gulf of Alaska. Within a short time the fire raged out of control and it became clear that the vessel would have to be abandoned. Although one crewmember was killed fighting the fire, the miracle was that over 200 people were safely evacuated without a single other major injury. The professional response of the crew made that miracle possible. And that response was made possible by training; training that had not existed in prior years. When the smoke had cleared, experts agreed that many more casualties would have resulted were it not for the effective response of the crew.

Rarely is it possible to see the results of a program so clearly. More often, thankfully, the results are less spectacular. But that incident proved to me that in the fishing industry, the results are worth the effort. The safety bar has been raised in the last ten years, to be sure. But much remains to be done.

Thus the challenge, and the opportunity.

NORWEGIAN SEA SAFETY TRAINING FOR FISHERMEN

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INTRODUCTION

“Safety Training for Fishermen” (STF) is a national compulsory program for all fishermen on board Norwegian vessels. STF started as a project in 1981. In 1985, the government decided that the STF should be a permanent arrangement. Since then the administration of this national training program has been an independent department of Tromsø Maritime Academy. The training consists of a 40-hour basic course, and after five to eight years there is a 20-hour repetition course.

BACKGROUND

The STF project started due to the awareness that great numbers of fishermen died or were injured when working. Research in the seventies documented very high accident rates in the Norwegian fishing fleet. In order to reduce the high risk of accident, several safety measures had to be taken. Good safety training was one of the most important measures pointed out by the researchers.

During the project’s first year, in 1981, the training consisted of two-day curriculum that emphasized sea rescue and fire protection. Since 1982 the project has grown and it now offers week-long (40-hour) Safety Training courses. In 1985, the project’s directing group presented a report that concluded that STF should be institutionalized, and should be given near the fishermen’s homes, in a number of fishing ports.

The Norwegian Parliament subsequently decided that STF should be compulsory for all fishermen, and that the State should finance the training.

REGULATIONS

After Parliament ratified the legislation calling for mandated STF, the Maritime Directorate drew up the appropriate regulations. These regulations, developed in 1989, were confirmed by Parliament. The regulations call for all workers on board Norwegian vessels, to have the 40-hour basic course of sea safety training, or safety training for maritime personnel. The regulations require that the fishermen must go through with a 20-hour repetition course within five to eight years after the basic course. For fishermen over the age of 60, the repetition course is voluntary.

The regulations also contain documentation of training. This means that everybody on board Norwegian vessels must have either approved training, or proof of dispensation. Dispensations are normally only provided on a one-time basis, for the first trip at sea, and last no longer than three months.

The regulations also require that a central register be kept of fishermen with approved training, and that the register must be tied to the census of fishermen. The administration of the Sea STF is responsible of keeping these registrations.

FINANCE

The basic Safety Training program is completely financed by the Norwegian government. Beginning in 2000, however, fishermen have to pay a fee of NKr2200 (U.S.\$245) when participating in the repetition course. The program budget for year 2000 is NKr20 million (U.S.\$2.2 million), of which the government pays NKr15 million. The program's cumulative cost, since its beginning in 1981, was about NKr250 million (U.S.\$28 million) by the year 2000.

THE TRAINING PROGRAM

The curriculum provided by the STF program covers the following topics: survival and rescue from accidents at sea; fire protection and fire-fighting; working conditions, hazards and protective measures on fishing vessels; first aid; and laws and regulations concerning the safety of fishermen.

After instructions from the Ministry of Church, Education and Research, researchers at MARINTEK evaluated the STF curriculum in 1989 and 1996. Both times the evaluation concluded that the sea safety training gave the fishermen better knowledge, greater understanding and improved attitude about the importance of workplace safety.

The evaluation pointed out the value of site-based training, near fishing ports and communities, as crucial to the success of the project. Training near the fishermen's homes has contributed to a change of attitude and a greater feeling of safety not only for the fishermen, but also for the people of the communities along the coast. However, the evaluation in 1996 concluded that more of the training could be moved to the stationary safety training centers. The program has opted go for a mixture of ship-based and stationary training centers. Since 1998, the Sea STF has had a roving ship training center, and six stationary safety-training centers located along the coast. In the past few years, 50 percent of training courses have been offered on the program's training vessel.

TEACHING PERSONNEL

Nautical education, experience, and further training in safety-related subjects are required for those who teach at the courses and work on board the training vessel. In addition, instructors must be certified as high school teachers.

MARKETING

Marketing of the courses is mainly done by mailing individuals. Larger Norwegian shipping companies often promote training opportunities, as well. Media outreaches, using national and regional newspaper and magazine ads, are also common approaches. Courses are promoted in cooperation with the fishermen trade unions and the local authorities.

COLLABORATION

The Norwegian Ministry of Church, Education and Research enacted a steering committee to help oversee the STF program. The committee provides advice in questions of trade and management. The committee functions as a board, and represents five organizations: The Directorate of Fisheries; The Council for Labor Supervision on Norwegian Ships; Norwegian Fishermen's Association; The Union of Norwegian Sailors; and a School of Fishery.

STF also collaborates with other institutions: The Ministry of Church, Education and Research, on finance, course distribution, development and administration; The Maritime Directorate, on rules, regulations, subject plans and dispensations; The Ministry of Fisheries, on census of fishermen, coursing and registration; The Main Rescue Co-coordinating center, on the sea rescue exercises; Rescue helicopters, on the “pick up” rescue exercises; The Fishermen’s trade unions, on safety issues; SINTEF Fisheries and Aquaculture (previously MARINTEK), on accident statistics, safety projects, teaching aids and evaluation; and producers of rescue material and safety equipment

COURSE PARTICIPATION

There have been approximately 20,000 registered fishermen in Norway since 1980. Work force turnover is about 10 percent. From 1982 to August 2000 about 27,000 people (mainly fishermen, but also a substantial member of school pupils) completed the basic course. The repetition course was initiated in 1996, and about 5,300 fishermen have completed this course.

RESULTS

Before the program started in 1981, the number of fishermen who died from work related accidents were about 30 each year. In the late 80s and early 90s the number of accidents decreased. During the latest four to five years the accident rate in the Norwegian fishing fleet has apparently been substantially reduced. This reduction is partly explained by the large numbers of fishermen who now have completed safety training.

FUTURE PARTICIPATION

The evaluation from 1996 concluded that after year 2000 there would be a need for 1,000 basic course places, and 2,800 repetition course places annually. However, our experience these last years is that the attendance to the repetition course is less than expected, and more than expected to the basic course. The reason to this is probably that there is a greater replacement in the profession now than earlier. Experienced fishermen have often found other occupations after eight years, and they are being replaced by young fishermen who don’t need repetition courses, but basic courses. The real needs seem to be 1,400 basic course places, and only 1,000–1,200 repetition course places each year.

TRAINING

Even if the number of fatal accidents has been considerably reduced over the last years, there are still work-related accidents on board that can lead to great personal injuries. For this reason it is very important that we pay close attention to what kind of accidents actually happens in the fishing fleet, and adjust our subject plans so that they concentrate on situations that actually cause injuries.

FUTURE NEEDS

The main objective of the safety training will remain on reducing the number of fatal or disabling personal injuries to fishermen. How to avoid accidents will have high priority. Increased focus on working conditions and health issues is needed. This may necessitate a differentiation of the courses, to better cover the special conditions of various fisheries and vessel types. Special courses will be considered, for instance on stability and vessel operation of skippers of small and medium sized fishing boats, emergency handling etc. Better Nordic cooperation on safety training and certification is needed, to make the labor markets more open to fishermen from the Nordic countries.

INTERNATIONAL COOPERATION

The International Maritime Organization (IMO) has minimum requirements to everybody working at sea, except for those on fishing vessels. Still there are forms of safety training in different countries. The Norwegian Maritime Directorate approves documented Safety Training from another country for work on Norwegian vessels. We are familiar with that some countries have different types of safety training, also especially for fishermen. But often these courses are attached to other education. As we know, IMO is currently working on STCW-F.

NORDIC COUNTRIES

Norway was the first country in the world to start this systematic training, and the results have attracted attention from other fishing nations.

Iceland, Sweden and Denmark have different types of safety training targeting fishermen. The Farø Islands also have a safety center for fishermen and other Maritime personnel.

Finland and Greenland have yet to implement a comprehensive safety program for fishermen.

CONCLUSIONS

STF has been successful and met the educational standards set by workers and the State, as shown by the reduction in the number of fatal accidents among Norwegian fishermen. STF continuously spreads knowledge and is an important element in increasing the security of those who work on fishing boats.

The organization of STF must, to retain its integrity and independence, have its own board that has the total responsibility for developing the education and running the courses.

There is a need for annual grants from the State of NKr18 million (U.S.\$2.1 million), based on the current structure and future needs.

STF must be organized centrally and executed locally to achieve maximum efficiency. International standards for minimum safety training requirements are needed.

THE CHILEAN SAFETY ASSOCIATION AND THE PREVENTION OF RISK IN THE CHILEAN FISHING SECTOR

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THE CHILEAN SAFETY ASSOCIATION

The Chilean Safety Association is a mutual benefit fund, that administers the workmen's compensation act for occupational diseases and accidents. There are currently three Mutual Benefit Funds in Chile, and the Chilean Safety Association is the largest with 53 percent of the market. These Mutual Benefit Funds are private, non-profit corporations managed by a labor dispute board of directors made up of six full members — three representatives from member companies and three worker representatives. These Mutual Benefit Funds provide member workers and companies with the following benefits: risk prevention; medical care; financial benefits: subsidies, compensations and pensions; and rehabilitation.

These Mutual Benefit Funds are funded by means of an obligatory contribution charged to employers, since the latter are still responsible for accidents. There is a basic contribution of 0.95 percent of taxable wages, and an additional contribution of up to 3.4 percent for presumptive risk linked to the activity of the company. The average rate currently stands at 1.8 percent. The fishing sector's rate is 2.55 percent. There is a system of incentives and penalties for employers keyed to their companies' workers risk prevention programs. The lower a company's accident rate, the lower the additional contribution and, if the accident rate climbs, the additional contribution will also be higher. The contingencies that are covered include occupational accidents; accidents en route to work; and occupational diseases.

The Chilean Safety Association has 1,400,000 affiliated workers and 36,000 member companies. It has reduced its accident rate from 35 percent in 1969 to 8.1 percent in 1999. The Association has seven hospitals, 21 clinics, 84 polyclinics and more than 700 hospital beds. It has reduced the average number of days of treatment from 30 days in 1969 to 9.3 days in 1999. It has excellent rehabilitation, which provides for successful job reinsertion: 80 percent of rehabilitated workers return to work, including 99.7 percent of all workers who have suffered a serious injury.

CHILEAN AQUACULTURE AND INDUSTRIAL FISHING SECTOR

FISHING SECTOR

During 1999, there were 474 vessels in Chile. The industrial fleet operating in domestic waters landed a cumulative total of 4,200,000 tons. The main resources landed were pelagic species. The main type of fishing is purse-seining with 64 percent, followed by trawling with 22 percent. A total of 448 processing plants were active in 1990, processing a total of 5,500,000 tons of raw material.

AQUACULTURE SECTOR

Eight hundred and fifty centers operated in 1999 harvesting a total of 310,000 tons, of which 75.5 percent were fish, 14.3 percent mollusks and 10.2 percent algae. The aquaculture sector has evidenced sustained growth, exporting more than U.S.\$750 million in 1999.

THE CHILEAN SAFETY ASSOCIATION AND CHILEAN FISHING SECTOR.

In December 1999, 360 fishing companies, with 25,000 workers, were members of the Chilean Safety Association. The accident rate of the fishing sector dropped from 24 percent in 1992 to 14 percent in 1999. The percentage of accidents by area of fishing activity are fishing fleet, 63 percent, and fishmeal plants, 37 percent.

Sea-going personnel suffer the largest percentage of accidents with a greater incidence among the crew of fishing vessels, especially during casting and

harvesting activities. The most frequent type of accident is being hit by, or knocking against, material objects used in the maneuvers (especially during rough seas and night work). The main agent causing the accidents are elements used in the maneuvers (cables, ropes, tacking equipment and work surfaces). The body's upper extremities suffer the most injuries with 48 percent of the total.

THE CHILEAN SAFETY ASSOCIATION AND THE FISHING PROGRAM

As part of its policy to constantly evolve and adapt to changes and new requirements of domestic production, for some years now the Chilean Safety Association has implemented an Overall Plan for the Aquaculture and Fishing Sector, which, among other things, seeks to provide this important economic activity of the country with specific advisory services geared towards reducing the sector's accident rate indices.

The fishing program's main goals are to increase risk prevention training, skills development and exchange of experiences among affiliated workers of the Chilean Safety Association nationwide, and to reduce occupational accident rates in the aquaculture and industrial fishing sector.

The activities of the Chilean Safety Association in the Fishing Risk Prevention Program are geared primarily towards accomplishing our two main goals in accordance with our institution's strategic directives. The Chilean Safety Association has set up the following strategic directives for Risk Prevention: to be a leader in risk prevention; to increase loyalty and customer satisfaction; and to strengthen the public image.

The Chilean Safety Association has developed a variety of services and products aimed at different sectors of the aquaculture and fishing sector, with its sphere of action covering the whole Chilean coastline. These services are delivered with technical support from the various Units in existence: Physical Risk Unit, Chemical Risk Unit, Biological Risk Unit, Ergonomics and Fire, among others. Products aimed at the aquaculture and industrial fishing sector include the following:

Fishing Safety

Recognition and evaluation of risks in fishing operations, both on board vessels and in processing plants;

Advisory services to draw up and execute comprehensive risk prevention programs;

Drawing up of work procedures for critical activities in fleet and plant; and

Evaluation of preventive measures in management policy.

Industrial Hygiene

Recognition, evaluation and control of physical, chemical, biological and ergonomic risks affecting fishing workers.

Ergonomics

Physiological evaluation of fishing workers; and

Program of corrective exercises for problems of posture and physical recovery on the job.

Occupational Health

Define and evaluate job profiles (physical, psychological, sensorimotor and technical requirements).

Legal Consultant

Support in operational aspects of the Workmen's Compensation Act for Occupational Diseases and Accidents (Law Number 16,744 and its supplementary decrees).

Statistics

Deliver statistical reports on accident rates of the aquaculture and fishing sector; and

Prepare studies of the sector's accident statistics.

Training

Management training and workshops for plant and fleet supervisors; and

Specific courses for the fishing sector (risks on board, risks in reducing plants, risks of sulphidric acid, survival in the sea, among others).

Publications

Preparation of manuals, booklets and posters to support preventive measures and training;

Participation with technical articles in magazines from the aquaculture and industrial fishing sector; and

Production of aquaculture and fishing risk prevention videos. (The most recent videos produced include “Trolling Safety,” “Surviving in the Sea,” “Safety in Salmon Processing Plants.”)

Agreements

Work, research and cooperation agreements with foreign and domestic institutions.

SCIENTIFIC RESEARCH

The Chilean Safety Association leads the field in scientific research, just as it does in matters of prevention. The recent research into the fishing sector undertaken by our Institution is proof of that. The aim of that piece of research was to become acquainted analytically with the fishing activity, its work conditions and associated risk factors. The study will soon be published in Chile.

FISHING SECTOR: WORK CONDITIONS AND RISK

This section of the paper will describe the Chilean fishing workforce, their injury risk factors and their relationship to work conditions. The significant physical, psychological and social detriment is known to affect directly work, and consequently productivity. Different methods for fishing capture are used

in Chile. However, the most relevant one for this study is that known as purse-seine, whose main resource is pelagic fishing: Spanish sardine (*Sardinops sagax*), anchovy (*Engraulis ringens*), and jack mackerel (*Trachurus murphyii*), mostly used in fish meal and oil plants. Work conditions include all of the factors integrating the realization of concrete tasks that decisively have an influence on the workers' health. A descriptive study was designed to define the principal components of the present industrial fishing sector.

For this purpose several instruments were developed and used to measure and collect both qualitative and quantitative information on the dimensions that compose the work conditions of said sector: general personal characteristics and job conditions, workday, free time and contractual situations; general condition of the ships, safety, emergency preparedness, rough work style, level of knowledge, on-board organization, alcohol and drug consumption.

The team was conformed by an engineer expert in safety and risk prevention, a psychologist and a sociologist, whose job was entirely carried out on site in both northern and central southern Chile.

METHODOLOGY

The theoretical methodological approach is of a qualitative and quantitative character and it aims at registering and systematizing any information referring to the work conditions of the fishing sector. Among the strategies employed to collect this information, the following techniques were used:

Direct or participating observation

The normal workday conditions were observed in the job of seining just as they show in its socioenvironmental ambience. For this reason the sociologist had to go aboard for twelve hours in the northern and central southern area of the country.

Interviews to key informants

Thirty exhaustive interviews were made. The people interviewed are representatives of the sector to which they are associated because of their experiences or the positions they have.

Questionnaires

An anonymous instrument for the collection of massive data consisting of a set of printed open and semi-open questions was applied in order to obtain objective indicators of the variables in question. This questionnaire was answered by 681 fleet workers. The size of the sample was determined by a simple random sampling of fishermen who were associated with industry partners of this study. All major seafood industries of Chile participated in the study by providing lists of fishermen who could potentially serve as respondents to the survey.

Focus groups

This technique implies the collection of a determined number of people to discuss, talk and reflect upon one or more themes. The participants give their opinions in an open and free way about themes of interest for the study proposed by the researchers. A total of 10 focus groups were conformed, with 9-14 participants in each group.

RESULTS

Of the relevant themes addressed in the study, the following are highlighted:

As far as the general condition is concerned, the ships have had a significant improvement in terms of habitability and comfort in comparison to those existing a decade ago. This improvement has enabled that the factors considered bothersome, have diminished, though still present in older ships.

The potential risks of accidents are present at every moment, from the moment the crew members go aboard to the fishing task; therefore we consider it essential that every time the crew members require anything dealing with the condition of the equipment and maneuver elements, these should be attended to, welcomed and solved positively by the corporations. Undoubtedly, this will make the job safer and free from accidents to the workers of the sector.

The factors that have affected the fishing sector are, among others, the event of El Niño current and closed seasons. This has required that some labor changes should be made, changes that have affected the workers and

the companies. They have to diversify their products and adapt themselves to this new economic situation. Also this situation has passed to the companies related to the sector and to the regional economies. As mentioned, the former has also had a significant impact on the workers as to their work stability is concerned. This has meant that they have to reinsert themselves in other productive areas. Keeping in mind the specificity of the work done by the seamen, in many cases it has meant an important diminution in their living conditions and those of their families.

In relation to the factors that have a bearing on the present problems of fishing, the following were mentioned: lack of governmental policies, overexploitation of the resource associated to the absence of control mechanisms in the regulation of this one by the authorities and the event of El Niño current. According to the interviewees, there is the need of a better planning by the authorities in the regulation of the extraction of the resources, which must incorporate all of the actors involved, government, entrepreneurs, workers and entities related to the sector.

The factors mentioned as determinants for the good work performance in the fishing sector would be as per their importance: psychological aspects, general conditions of equipment of the ship, work stability, personality traits of the skipper, environmental conditions of the job, technical training level of the crews, technical training in the area to work, family situation, capacity for personal development, specificity of the functions and physical capacity of the workers.

Fleet workers say that they experience good relationships with other workers, emphasizing the sense of humor that they share. The workers themselves consider workplace humor a necessary ingredient to keep workplace morale high.

The human relations of the workers with the different sectors of the company fluctuate from bad to excellent, depending on the position of the workers with respect to relationships with safety personnel. We expected, before the study, that we would find that relationships between crew members and safety personnel would be strong, given the interaction between the two groups. However, most of these relationships were judged to be of poor

quality by the crew members. The type of relation observed with the fleet or bay bosses is different, relations which were, in general, acknowledged as good.

The attributions that the fishing skipper has give him ample authority, for this reason his leadership style establishes the work condition on board of the ship; in this way, his conducting style marks the different relations for all the crew, becoming a model and example in any situation.

Given the fact that in general there was a moderate existence of drugs in the ships, and asked which one would be the most present, marijuana was mentioned as the highest in percentage in the crews. However, it is important to manifest that drug usage does not constitute the norm according to the workers, although overall use may be higher in San Vicente, Talcahuano, and Iquique.

Considering the survey findings, we regard that with respect to the alcohol and drug consumption habits, a rigorous control by the companies is suggested; this can be done at the moment of selecting the personnel through the application of questionnaires oriented to detecting alcohol and drug consumption, or through permanent workshops in the company. Experienced professionals must conduct these workshops. In the case of carrying out the workshops with contracted personnel, the suggestions by the trade unions can be incorporated, as they usually have some information about the workers presenting difficulties in relation to the theme described.

As to the levels of stress, there is no doubt about the risks that the workers of the fishing sector are exposed to. The climatic factor, the rapidity with which they should act in maneuvering, especially when casting, augment the stress levels. That is why a great psychological strength is required to assume not only the risks pertaining to the job but also the long periods away from home, the irregularity of the workdays, the adaptation to the constant changes of the rhythms of sleep and wakefulness plus the uncertainties of the sector due to occasional factors.

From the focus groups it can be seen that the crews recognize they experience family problems derived from their work routine. These difficulties present

themselves at a couple and parent level. In relation to the latter mentioned, the woman must consequently assume roles that are socially shared with her husband, such as the administration of the economic resources, the establishment of norms and limits within the home, the educational support of the children and health care among others.

In relation to the couple, the problems they face and solve are varied, including communication, power relations, infidelity, intimacy, sorrow and frustration issues. These are themes that are difficult to address. It is important to add that for sea people the family constitutes a fundamental solid pillar that they considerably respect, becoming a motivating agent for work performance.

CONCLUSIONS

In the case of industrial fishing, it is important to keep in mind that in the last few years this sector has been a significant national productive area, in spite of the oceanographic problems affecting it lately. Accident rates reached one of the highest indexes over the last year against other economic activities. Nevertheless, these have been gradually decreasing, signifying great advances in the accidents occurring in the sector. The participation of industries, companies, professionals, seamen, and all the entities related to this important economic activity of the country, denote an increasing intention towards preventing risks that cannot be ignored. The technological capacity of the fishing ships has notably developed in order to improve capture and safety efficiency. Modern navigation information systems require that captains, officers, engineers, boatswains, and crew members receive constant training to catch up on the technical knowledge to operate the mechanisms of the ship in a safe and efficient way. The industrial fishing sector has made relevant technological changes in the environmental development to attain harmony between the productive work and the environment, minimizing the impact of industrial wastes.

Finally, it can be said that the crews manifest a deficit or lack in matters of risk prevention in the training that the companies carry out. It is known that there are some norms issued from the Maritime Authority as to the obligation to carry out the OMI Model courses (basic knowledge of medical assistance, sanitary first aid, survival in the sea and in fires), essential requirements before going aboard. To achieve better safety levels for this sector, necessarily implies increasing training actions, which should be oriented to develop a risk prevention

culture, with a solid formation in themes such as leadership, team work, self-care, management of stress levels, stress control, and control of the consumption of alcohol and drugs.

The Chilean fishing activity poses enormous challenges to solve. The diminution of debarkations of pelagic species in the northern and central southern areas has meant that the fishing industry has had to reshuffle its operation plan with redistribution and/or a partial stagnation of the fleet, cost diminution and personnel dismissal. Consequently, the fishing sector is going through a period of changes, characterized by low captures, over investments in the fleet and restrictions in the access to the resource. This setting makes it necessary to face it, optimizing the operations, making them safer, allowing the fishing sector workers better and more comfortable work conditions.

