

Evolution of Training for the Maritime Oil and Gas Sector on the Canadian
East Coast

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Abstract

The training regime for health, safety, and environment (HSE) was revolutionised following the loss of the OCEAN RANGER on the Grand Banks in 1982. Amongst the many recommendations of the Royal Commission that investigated the loss of the OCEAN RANGER were a number related to the improvement of training for offshore workers on the East Coast. Since the OCEAN RANGER incident, all levels of government, as well as the oil and gas industry, have invested heavily in developing a comprehensive suite of training programs and training facilities for offshore workers off Canada's East Coast. A central theme of the development of training capacity on Canada's East Coast has been to ensure that the programs offered are effective in reducing risks of offshore activity.

This paper, presented by the Fisheries and Marine Institute of Memorial University of Newfoundland, will review the immediate impact that the loss of the OCEAN RANGER had upon HSE training in Eastern Canada; the process that has been developed to identify and implement new programs; identify the types of HSE training programs that been developed; provide an overview of the investment made in training infrastructure; and finally to forecast possible future directions in HSE related training in Canada.

The OCEAN RANGER Disaster¹

On February 15, 1982, the semi-submersible drill rig OCEAN RANGER, while drilling on the Grand Banks, was lost during a violent North Atlantic storm. All 84 men on board perished in the incident. At the time of its sinking, the OCEAN RANGER was one of the world's largest semi-submersible rigs, and its loss had an enormous impact on offshore safety in Canada.

¹ The information in this section is derived from *Report One: The Loss of the Semisubmersible Drill Rig Ocean Ranger and its Crew*. Royal Commission on the *Ocean Ranger* Marine Disaster: Ottawa, 1984.

On February 14, 1982, an intense low pressure hit the Grand Banks, with forecasted maximum winds of 90 knots and maximum wave heights of 37 feet (11.2m). At about 2000 hrs on February 14th, a large wave hit and broke a porthole in the OCEAN RANGER's ballast control room. The ingress of sea water shorted out the electro-pneumatic ballast control panel, rendering the system inoperable.

At about 0030 hrs on the 15th, it is believed that power was restored to the panel causing some of the ballast control valves to open unexpectedly. Sea water entered the forward tanks in the port pontoon, and caused a rapid list to port and trim by the bow. The Royal Commission suggested that the crew attempted to gain control of the ballast system through a variety of means, all of which were ineffective. It is questionable if the crew understood how to use the manual over-ride systems, or fully understood the design limitations when trying to pump out their forward tanks under large trim angles.

The net result was that the trim could not be controlled, and at 0109 hrs on February 15, the OCEAN RANGER issued a distress call. The rig commenced evacuation by lifeboat at about 0130 hrs, and eventually capsized and sank around 0315 hrs. Attempts to rescue those who managed to escape from the rig were futile, and all 84 men onboard were lost.

Impact of the OCEAN RANGER disaster on Oil and Gas Training in Canada²

The loss of the OCEAN RANGER, and the resulting loss of its crew, was attributed to a combination of design flaws; inadequate training; and, the lack of suitable evacuation and survival equipment. Although

² The information in this section is derived from *Report One: The Loss of the Semisubmersible Drill Rig Ocean Ranger and its Crew*. Royal Commission on the *Ocean Ranger* Marine Disaster: Ottawa, 1984.

the focus of this paper is on training, it must be noted that a significant effort has been devoted to addressing the other concerns of offshore rig design and survival in harsh environments.

One of the conclusions from the investigation of the OCEAN RANGER disaster was that:

“Despite the failure of the portlight and the malfunctioning of the ballast control panel, the loss could have been prevented by knowledgeable intervention on the part of the crew. Indeed, had the crew only closed the deadlights, cleaned up the water and glass and then retired for the evening, the Ocean Ranger and its crew would have survived the storm that night.”³

Under the regulations that existed at the time, the operators of the rigs operating on the Canadian East Coast were responsible to ensure that the crew were “adequately trained”. The operators relied upon the owners of the drilling units to define and conduct the training, and government relied upon the industry to be self-regulating. During the course of its investigations, the Royal Commission noted that there was a strong emphasis on on-the-job training programs, even for those in safety critical positions (such as ballast control operator). At the time of the loss of the OCEAN RANGER, there was no objective means to demonstrate that personnel on rigs were qualified or competent to hold safety critical positions.

The Royal Commission did not restrict its attention to the training required to safely operate the rig, but also considered the training required by offshore workers in evacuation, survival and rescue. At the

³ Report One: *The Loss of the Semisubmersible Drill Rig Ocean Ranger and its Crew*. Royal Commission on the *Ocean Ranger* Marine Disaster: Ottawa, 1984. (p.139)

start of 1982, there were no nationally recognized standards for safety training in the Canadian Offshore⁴. Responders were also inadequately prepared through training and exercising programs to deal with rescue in high seas.

These observations lead to the conclusion that the entire training regime for offshore workers needed to be critically reviewed. The Royal Commission recommended that training standards needed to be established by regulatory authorities; offshore personnel be required to obtain certification issued by appropriate authorities before holding key positions (especially that of ballast control operator); and, that the development of uniform international standards be pursued.

Process to Improve Training for the Canadian Offshore⁵

At the time of the OCEAN RANGER, there was a confusing labyrinth of legislation and industry standards concerning the training of offshore workers. The Royal Commission noted that:

“the major shortcoming of training for safety in the East Coast offshore has been the absence of clear standards and a clear definition of the roles and responsibilities of government and industry.”⁶

To begin with, the Flag State, in the instance of the OCEAN RANGER was the United States, did not have any regulatory requirements for

⁴ *Marine and Safety Training in the Eastern Canadian Offshore Petroleum Industry: A Study for the Royal Commission on the Ocean Ranger Marine Disaster*. The College of Fisheries, Navigation, Marine Engineering and Electronics: St. John's, 1984. (p.17)

⁵ Except were noted, the information for this section was derived from *Marine and Safety Training in the Eastern Canadian Offshore Petroleum Industry: A Study for the Royal Commission on the Ocean Ranger Marine Disaster*. The College of Fisheries, Navigation, Marine Engineering and Electronics: St. John's, 1984.

emergency training other than standard drills. The American Petroleum Institute (API) and the International Association of Drilling Contractors (IADC) had established voluntary training standards for H₂S, safety measures and firefighting, and many companies had followed these standards. The US standards, however, were not geared for operations in the harsh climate off Canada's East Coast.

The Coastal State, Canada, was in the midst of a jurisdictional dispute between two levels of governments at the time of the OCEAN RANGER, and did not have a co-ordinated approach to offshore training.

In the Federal Government, four (4) Departments had elements of responsibility for training in the offshore. The two lead Departments were the Department of Energy, Mines and Resources and the Department of Indian Affairs and Northern Development. Both Departments established the Canadian Oil and Gas Lands Administration (COGLA) who regulated offshore activities through an application-permit system. Transport Canada, through the Canadian Coast Guard, regulated SOLAS related training and certification, and assisted COGLA by providing marine safety expertise. The Canadian Employment and Immigration Commission also had an interest in implementing effective training and development programs to permit Canadians to enter the oil and gas industry.

The Provincial Government, the Province of Newfoundland in the case of the OCEAN RANGER, also claimed jurisdiction over the offshore, and had established the Newfoundland and Labrador Petroleum Directorate. The Petroleum Directorate had a similar function as

⁶ *Report Two: Safety Offshore Eastern Canada.* Royal Commission on the *Ocean Ranger* Marine Disaster: Ottawa, 1985. (p.80)

COGLA, part of which was to ensure an adequate degree of human and environmental safety in the offshore industry. The provincial Department of Education held the responsibility for training institutions and programs delivered in the Province.

To further complicate matters, there were several industrial organizations (the Canadian Association of Drilling Contractors and the Canadian Petroleum Association being two key ones) with an interest in offshore training. There was (and still is) also a Petroleum Industry Training Service (PITS) that is an industry-governed non-profit training organization serving oil and gas workers⁷. The primary focus of PITS, however, is on oil and gas operations and not on maritime safety. PITS does, however, provide training programs on oil spill response, and on-scene co-ordination for oil spills.

There was a clear requirement to establish training standards and clarify the regulatory accountability for the standards. What happened in effect, was a consolidation of regulatory responsibility to two government entities. The first is the Canada-Newfoundland Offshore Petroleum Board and the second is Transport Canada.

Through the Atlantic Accord, responsibility for managing the East Coast offshore areas is jointly shared by the Federal and Provincial Governments. Both Nova Scotia and Newfoundland have established Offshore Petroleum Boards with the Federal Government. One of the functions of the Boards is to ensure that offshore operations are conducted safely. One of the key tools used by the Boards to ensure safety is maintained is the “Certificate of Fitness” process⁸.

⁷ For more information on PITS, see their web site at www.pits.ca.

⁸ For details consult the *Canada-Newfoundland Atlantic Accord Implementation Act* and the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act* at <http://lois.justice.gc.ca>.

Operators must provide a comprehensive and detailed Safety Plan to the Petroleum Boards, covering all aspects of operations, including training and qualifications that will be demanded of offshore workers. The training and qualifications component includes elements such as hiring and placement; qualifications and training; safety and emergency response training; competency assessment; and tracking and documentation.

Attached to the Safety Plan is a “Declaration of Fitness” that is signed by the operator and declares that the equipment and installations are fit for purpose; procedures are appropriate; and, personnel are qualified. Operators are routinely assessed to ensure that the Safety Plan and the Declaration of Fitness are valid throughout the life of their project.

One may ask, how do the two Petroleum Boards determine if the training described in the Safety Plan is suitable for offshore operations? One of the recommendations from the Royal Commission was the creation of a training standards board that would be responsible for training and qualifications standards; certification and recertification requirements; verification and audit measures; and approval of training institutions and facilities. Under the Acts creating the Petroleum Boards are provisions permitting governments to establish a training standards board similar to the one envisioned by the Royal Commission⁹.

In practice, however, an industry association, the Canadian Association of Petroleum Producers (CAPP) is fulfilling many of the functions of the training standards board. CAPP training and

⁹ s. 5.5(1) of the *Canada Oil and Gas Operations Act* as well as s. 136.2 of the *Canada-Newfoundland Atlantic Accord Implementation Act* for example.

qualifications guidelines are intended to describe “the minimum qualifications and certificated safety training required of individuals working in Canada’s east coast petroleum industry¹⁰.” A joint committee, comprising of industry, government, and the Petroleum Boards, is used to develop the guidelines as well as to review them to ensure that they remain current.

Transport Canada is the Federal Department responsible for the regulation of maritime safety in Canada, and has established a number of regulations and standards that govern standby vessel crew training and the general safety and survival training of seafarers.

The Transport Canada certification standards are published in *The Examination and Certification of Seafarers* (TP 2293), and are developed pursuant to regulations of the *Canada Shipping Act*. The Transport Canada standards are reviewed and validated by industry through the Canadian Marine Advisory Council.

Training Programs Developed for the Canadian Offshore

Although CAPP and Transport Canada have developed training standards and guidelines, nautical colleges and private corporations are expected to develop course material and deliver the training programs to students.

Courses developed by training providers are reviewed and formally accepted by the appropriate authority. CAPP includes a list of recognized training providers in its training and qualifications guidelines, while Transport Canada publishes a listing of approved

¹⁰ *Canadian East Coast Offshore Petroleum Industry: Training and Qualifications Guidelines*. Canadian Association of Petroleum Producers (Doc. #22443): St. John’s, March 2001.

courses by school in *Transport Canada Marine Safety Directorate Approved Training Courses* (TP 10655). Under the provisions of STCW, Transport Canada also requires schools to implement quality control procedures to ensure the integrity of the training system. My home organization, for example, is registered under ISO 9001 by KPMG Ltd.

In general, the courses developed by the training providers can be categorized under one of three general headings: personal safety training; technical safety training; and, marine crew training. Time constraints preclude a detailed overview of all the programs that have been developed by training providers that relate to offshore safety and survival. There are some courses that are seen to be particularly important, and these will be briefly described¹¹.

Basic Survival Training (BST) is intended to provide personnel with a basic understanding of the hazards associated with working in the offshore environment; the knowledge and skills to react effectively to offshore emergencies; and, the ability to care for themselves and others in a survival situation. BST is a five (5) day program, and is mandatory for all offshore workers (including temporary employees, contractors and shore personnel whose duties include travel to offshore installations).

It is important to note that the BST course is not equivalent to survival training provided to mariners under the STCW Convention. The BST program is focussed on a wide range of specific risks associated with offshore operations such as helicopter egress, fire fighting, lifesaving appliances, and personal survival. Practical exercises form an

¹¹ The course descriptions are based upon the information found in *Canadian East Coast Offshore Petroleum Industry: Training and Qualifications Guidelines*.

important part of the program to ensure that workers have demonstrated the necessary skills to survive in the offshore environment.

Stability and Ballast Control training is a form of technical safety training provided to offshore workers. The training program is intended to supplement the knowledge of personnel already familiar with ship stability (at the level of chief officer/master) with the special stability considerations of either a semi-submersible or a jack-up rig. The course consists of both lectures and practical exercises in a full mission simulator.

For marine crews, Fast Rescue Craft training was developed to ensure that boat crews on standby vessels were able to safely operate their FRCs during rescue missions. The program requires practical demonstration of the ability to operate a FRC under a variety of conditions, but at the present time does not have a practical component for launch and recovery in heavy seas.

In addition to the mandatory programs, a large number of courses have been developed to meet the needs of the growing oil and gas industry in Eastern Canada. Emergency Command and Control training for onshore and offshore response co-ordinators has been developed, as have courses specifically related to FPSO operations (including dynamic positioning and liquid cargo handling courses). The Canadian Coast Guard has been proactive in developing specialized courses dealing with oil spill response and familiarization with maritime SAR operations. Programs related to ice management (an important issue on the Grand Banks of Newfoundland) and ROV operations are in the process of being developed for the offshore industries.

While training is important to ensure that workers have the necessary skills to perform their jobs, education is also necessary to ensure that the development of appropriate safety and environmental systems continues in a sustainable manner.

Canadian universities are providing advanced education that relates to the management of safety and the environment in the offshore industry. Memorial University of Newfoundland, for example, offers a Baccalaureate program in Maritime Studies (with a focus on marine operations and business) and has announced its intention to develop a Master's program in Maritime Safety (with a focus on technical and regulatory issues). Dalhousie University in Nova Scotia offers a Master's program in Maritime Management (with a particular focus on environmental and oceans policy).

Investment in Training Infrastructure

During the OCEAN RANGER investigations it was stated that: "Good training is expensive – full size equipment and elaborate simulators are needed for some aspects of offshore training.¹²" Within Newfoundland alone, governments and industry have invested at least \$34 Million (CAD) in establishing the training infrastructure necessary for competence based training in the offshore.

Two examples from my home organization can illustrate the above point. The Offshore Safety and Survival Centre (OSSC) was initially constructed in 1985 at a cost of \$6 Million (CAD). In 1994 OSSC was expanded to include advanced fire fighting training capabilities at a

¹² *Marine and Safety Training in the Eastern Canadian Offshore Petroleum Industry: A Study for the Royal Commission on the Ocean Ranger Marine Disaster.* The College of Fisheries, Navigation, Marine Engineering and Electronics: St. John's, 1984. (p.150)

cost of \$6 Million (CAD). In 2001 the latest expansion occurred with the reconstruction of the harbour-front training facility (\$5 Million CAD).

The Centre for Marine Simulation was constructed in 1994 at a cost of \$12 Million (CAD), and initially contained two advanced full-mission simulators on motion bases (ballast control and bridge). Various simulation facilities (dynamic positioning, engine room, blind pilotage, and radio) have been added since 1994 with an approximate value of \$3 Million (CAD).

The initial capital costs of establishing specialized training facilities in Newfoundland and to a lesser extent in Nova Scotia are only the tip of the proverbial iceberg. The maintenance, operating, and incremental upgrade costs of the specialized facilities also represents a significant investment by schools (and indirectly their clients through tuition).

The existence of the specialized facilities also provides a unique opportunity to conduct research and engineering studies to improve the state of the art in offshore safety and survival. Other speakers at this seminar will be describing a few of the key programs being undertaken in the St. John's research community.

Future Directions for Offshore Training in Canada

Effort is currently underway to finalize the details of the regulatory means to implement the Transport Canada standards for the certification of offshore workers. Discussions are ongoing with industry representatives as well as with the applicable Petroleum Boards. Once this process is completed, Canada's training standards will conform with Resolution A.891 (21) *Recommendations on Training of Personnel on Mobile Offshore Units*.

Initiatives are also underway in Canada to review the application of existing training standards to the crews onboard FPSOs. At the present time, personnel employed on-board the Canadian FPSO Terra Nova have maritime certification.

The Canadian Association of Petroleum Producers is expected to expand their training standards in the near future by adding details on training required for the production aspects of offshore operations.

Finally, research programs are underway to develop low-cost and effective PC based training simulators to supplement the existing training infrastructure. It is hoped that simulation based training for some subjects will be available through Web sites.

Concluding Remarks

In the harsh offshore environments off the Canadian East Coast, an offshore safety system based on on-the-job training doesn't work. Through the OCEAN RANGER disaster, Canada has evolved a comprehensive offshore safety training regime that is supported by both government and industry. As a participant in the evolution of the training regime, the Marine Institute welcomes this opportunity to share the Canadian experience at this seminar.