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The Ocean Ranger Disaster

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ABSTRACT

Offshore Newfoundland and Labrador lies the Grand Banks; an environment susceptible to the most disastrous of mother natures' forces. Beneath it, however, lays one of the worlds' most precious resources: oil. Many companies in the early 1980s were in search of this resource and used Semi-Submersible Drill Rigs as a way to drill for it. The Ocean Ranger was the largest drill rig of its kind in the world and provided many Newfoundlanders with a good source of employment. The Ocean Ranger was designed to withstand the harshest of environments, already proving itself on several occasions, including a treacherous winter on the Grand Banks. On February 14, 1982, however, a ferocious storm hit the Grand Banks, toppling The Ocean Ranger and killing all 84 crew members on board. The blame can be placed on several fatal errors. Fortunately, engineers have been able to evaluate these errors to ensure that this catastrophe never occurs again. This paper looks back on the events, decisions made and critical errors that led to the disaster and highlights the important engineering lessons learned from them [1].

1 INTRODUCTION

At 121 meters long, 80 meters wide, and 103 meters tall, The Ocean Ranger was thought to be capable of handling anything that the Atlantic Ocean could give her. Figure 1 demonstrates its impressive size.

Figure 1: The Ocean Ranger

It was a self-propelled, semi-submersible offshore drilling rig and Newfoundlanders hoped it could save the economy after the fall of the fishery. A semi-submersible drill rig is one that sits on large ballasted pontoons which control the position of the rig on the water. The series of valves and switches that control the water flow in these pontoons were located in the ballast control room. When the storm hit and the ballast room was flooded, disaster ensued.

The first oil projects in the province started in the 1960's but it wasn't until 1979 that oil was first found in the Hibernia field. The Ocean Ranger's task was to drill "delineation" wells to map that field. The Ocean Ranger disaster has been described as Canada's worst tragedy at sea since World War II. Three main errors led to this catastrophic event: The port hole in the control room broke, causing severe water damage. This was due to the fact that the exterior steel port holes were not properly designed, nor were they properly closed. Secondly, when the ballast control system was unable to function due to the water intake, the crew were unable to operate it manually because they had never been trained to do so. Thirdly, the crew on the watch ship that came to assist the Ocean Ranger were not familiar with the life boats. As a result the life boat capsized, killing the remainder of the survivors. 82 men were killed, 56 of whom were Newfoundlanders [2]. The Ocean's Ranger's position can be seen in Figure 2.

Figure 2: The Ocean Ranger Disaster Location

2 WHAT HAPPENED?

The United States Coast Guard Marine Board of Investigation summarized the chain of events leading to the loss of The Ocean Ranger as follows:

- The port hole in the ballast control room was broken by an uncharacteristically strong (rogue) wave, causing water to flood the room.
- Due to the flooding, the ballast control ceased to function.
- There was then a loss of power. It is not certain if the crew instigated this in attempts to repair the situation or if the storm was the culprit.
- Due to the water build-up, the rig began to tilt forward.
- This caused the forward chain lockers located in the forward corner support columns to fill with water, causing the rig to tilt even more dangerously.
- The water needed to be evacuated; however, the pumps were not able to be used due to the tilted position of the rig.
- The ballast control panel should have been able to be operated manually. None of the employees present were trained to do so.

- The valves in both platoons were closed, worsening the tilt.
- The excess of water reduced the rig's ability to float (i.e. reducing its buoyancy), causing it to capsize [3].

3 ERRORS

3.1 Lack of Training

The lack of trained operators in the ballast control room is a problem that could have been avoided. With only one qualified person per 12 hours shift, there were simply not enough hands to respond to a disaster such as the one in 1982. On a normal day, this person would have been responsible to note changes in the centre of gravity for the rig and to respond to stability changes by activating the ballast pump. The push-button switches allowed the valves to open and directs ballast water to where it was needed using the ballast pump. There was a "fail-safe design" that would allow the operator to operate the system manually in the case of emergency, however, the operator was not trained to use this technique and no instructions were outlined in The Ocean Ranger manual. The company should not have expected its operators to know how to handle a disaster. After all, they only required them to undergo two weeks of training prior to working in this vital position. Knowing that that a tilt of even 5 degrees could have disastrous results, it is astonishing that stricter training requirements were not made.

The next mistake was that of the operator. He waited too long to contact the *Seaforth Highlander* to alert them of the dangerous situation that they were in. Had he done that earlier, it is possible that assistance may have arrived in time to save some of the lives that were lost. Due to the excess of water in the control room, the only way for the crew to save The Ocean Ranger would have been to remove all the water from the bow tanks. However, the crew had mistakenly cut the power in attempts to repair the control console. Consequently, removing large quantities of water from the rig was simply no longer possible. While the crew attempted to remove as much water as they could, they could not do it fast enough to save themselves. Because of their focus on the ballast control room, no one was aware of the disaster that was occurring in in chain locker. The alarms that would normally have sounded were disabled due to the loss of electricity. The crew succeeded in restoring power to the rig, however, this proved to be an unwise move. With the power off, the pontoon valves had remained closed. Once power had been restored, they opened again causing water to pour into the front of the rig towards the ballast tanks. This, in turn, caused the rig to plunge forward [4].

3.2 Lack of Regard for Safety

Long before the disaster happened, The Ocean Ranger had the nickname of The Ocean Danger. This was due to the many safety concerns that existed among workers and their families. These concerns were not addressed by Mobil Oil. Safety was simply not a priority for this company. According to studies conducted after the disaster, there were only two working life boats on The Ocean Ranger and no survival suits. In addition to that, the workers were not trained in how to board the life boats or how to react to situations that may occur once they were inside of the vessel. When the *Seaforth Highlander* arrived and attempted to save the men, they all tried to climb out at the same time, causing the life boat to capsize. From there, the Highlander crew was unable to save any of the men from The Ocean Ranger. When interviewed by CBC, a former Mobil Oil employee indicated that safety was not considered important in the 1980s. For them, safety was considered to be having good

common sense to prevent injury. Owen Meyers was an employee on another rig at the time of the sinking. He recalls: "We didn't have anything. We didn't have all the survival suits like they have now. We had nothing. You were just going to go out in the Atlantic Ocean [5]." Despite the concerns of workers, Mobil Oil states that the safety procedures on The Ocean Ranger were "adequate [1]." Evidently the definition of "adequate" varies depending on who one asks. The families of those who were killed on February 14th, 1982, would affirm that, in their opinions, safety procedures were not adequate. The mother of a man who was lost on The Ocean Ranger states that she calls Mobil Oil a "murderer." The workers, including her son, were not trained to handle an emergency situation. To think that an emergency could never arise on their rig was simply arrogant. This arrogance can be partially attributed to the size of The Ocean Ranger. It was considered unnecessary to waste time and money on training for safety breaches that would likely never occur on an "unsinkable" vessel [1].

3.3 Engineering Errors

The chain locker and ballast control console design were two areas in which the engineers of The Ocean Ranger failed. The chain locker openings were meant to be kept away from the ocean's waves at all times to avoid flooding. However, there were no covers or gates to prevent this from happening. This indicates that the engineers did not take into account that a storm of this severity could hit The Ocean Ranger. Sadly, they were mistaken. There was a 5' hole at the top of these chambers. If filled, it could certainly cause the rig to capsize. Yet, there was no way to ensure that this didn't happen and there was no way for the crew to know when that chamber was filling with water [6].

The ballast control room, shown in Figure 3, was designed to be a waterproof area, as exposure to water could have catastrophic consequences within a very short period of time. However, there was a breakable port light in the control room. In addition to that, the console had no protection such as insulation. When the port light broke, The Ocean Ranger was left completely vulnerable. Figure 4 shows how the disaster could have started. Later studies showed that the glass did not meet either the industry standard for strength or the thickness shown on the rig's plans. In addition to that, the control console was the only way for operators to know if valves were opened or closed. If there had been an alternate system, the crew would have better understood the situation even after the console had been destroyed. Had they been able to understand what was happening, they may have been able to react in a more efficient way [7].

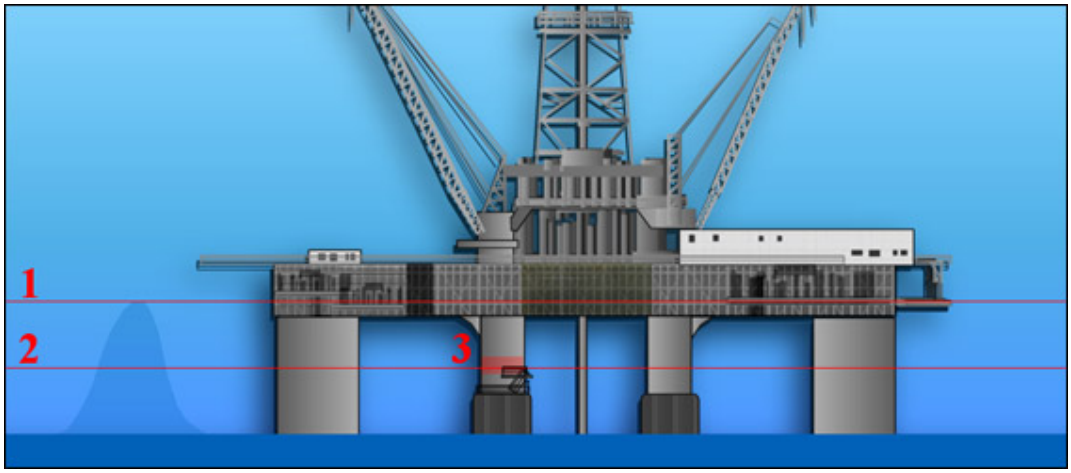

Figure 3: Ballast Control Room (3)

Figure 4: Porthole

4 CANADIAN INQUIRES RECOMMENDATIONS

Canadian Inquiries issued 136 recommendations following The Ocean Ranger disaster. These recommendations were made with the intent of reducing the likelihood of a catastrophe such as this reoccurring. The need for rig design changes was highlighted. The engineering errors outlined above contributed greatly to the capsizing of The Ocean Ranger. It was also stated that rigs need more life boats and that employees should be trained in how to board them and how to precede once they have boarded. If the workers had known what to do once they were in the life boat, they may have been able to prevent it from capsizing [1].

5 CONCLUSION

The sad and perhaps the most devastating discovery that has been made since that day in 1982 is that this tragedy could have been prevented. With more emphasis on safety, better training and fewer engineering errors, those 84 workers may have made it home. One can point the finger at several culprits when considering who is to blame. The engineer should never have placed a porthole in the ballast control room. He/she should have also ensured that the chain lockers were protected from the water. Mobil Oil should have better trained its workers and should have installed detailed manuals to be certain that workers could find out very quickly how to prevent further damage. The workers should have called for help earlier since they were not trained to handle the situation. Whoever we choose to blame, those lives are lost. We are now left to learn from our mistakes, ensuring that workers are better protected today because The Ocean Ranger went down.

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