



DEEPWATER HORIZON & MACONDO

A report by the Norwegian trade union, IndustriEnergi,
on the oil disaster in the Gulf of Mexico in April 2010:

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This report is dedicated to the 11 offshore workers who lost their lives on the altar of greed.

Preface

In the winter of 2011 the Norwegian trade union IndustriEnergi appointed a reference task force to:

- Review reports and data on the accident.
- Study these to see what HSE lessons that could be learned and how to implement these lessons in our HSE work both nationally and internationally.
- Evaluate the consequences of the accident for the offshore business in Norway and elsewhere around the world.
- Advise the trade union's decision-making body concerning the accident and the consequences of it.

The task force had its first meeting on 16 February 2011 at the Rica Maritime Hotel in Haugesund, Norway. The meeting discussed the mandate and working methods as well as reviewing the material at hand. Since then they have had 6 meetings and submitted their report at the beginning of September 2011.

The task force has based its work on reports, meetings and presentations as well as on the members' own experience. The task force has not physically conducted any investigations or questioned anyone. Our comments, summaries, conclusions and recommendations are mainly from other reports. We have looked into the causes which led to the blowout and the circumstances on the Deepwater Horizon and the evacuation of installation. The impact of the spill on the marine environment and life and animal life along the coast has not been addressed as that is outside of our area of competence.

Finally we want to thank ICEM Health, Safety and Sustainability Officer, Brian Kohler for his assistance and contributions to this report.

Stavanger/Oslo September 2011

Leif Sande

President, IndustriEnergi.

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Summary and recommendations

On 20 April 2010 the alarm was raised on the Deepwater Horizon, which was completing an oil well at the Macondo oilfield in the Gulf of Mexico in US waters. The explosion and fire led to 11 people losing their lives, 16 becoming injured and the rig sinking. There were a total of 126 on board, 6 from the operator BP, 79 from the rig owner Transocean and 41 hired personnel to perform service and specialised work. Most of the survivors were evacuated by lifeboats and picked up by vessel near the rig.

None of those on board the Deepwater Horizon were union members, and there is little or nothing in the reports to suggest any influence by employees on the organisation of the work, safety and emergency preparedness.

Oil and gas continued to flow uncontrolled from the well for 87 days and resulted in the biggest oilspill in US history.

US authorities have pointed to BP as "the company responsible for the accident" and will hold it liable for all costs and harm resulting from the oilspill.

We have concentrated our efforts on the circumstances which led to 11 fatalities and 16 injured.

The reports reveal that the main cause was a poor safety culture, resulting in:

- Serious safety system failure
- Poor and lacking equipment
- Continuous lack of maintenance
- Lack of knowledge
- Lack of training
- Lack of safety drills
- Lack of emergency preparedness to avoid and deal with disasters
- Inefficient decision-making processes
- Disconnection of alarms and shutdown systems

The standard requirements of ISMC (International Safety Management Code) were not complied with. This is best illustrated by the maintenance of the BOP (Blow Out Preventer which is to stop the oil and gas flow in the well during emergencies) being carried out at discretion. This resulted in lack of recertification and maintenance of the BOP.

Bonus schemes based on financial performance are most likely the main cause of an organisation developing a culture of greed, where the economy is clearly prioritised before such issues as safety, emergency preparedness, life and health. The work on the Deepwater Horizon was 45 days behind schedule and the budget had been exceeded by US\$ 58 million.

The human suffering and tragedies are horrendous, but also the economic and environmental consequences of offshore accidents lead to an indisputable conclusion:

Safety pays. The industry's attitude to offshore activities must be characterised by giving safety and emergency preparedness highest priority.

Everyone who evacuated the rig in lifeboats, rafts or by jumping into the sea were picked up by a standby vessel or pickup boats. There is a high probability that the weather conditions and sea temperature on the Norwegian shelf would have led to loss of life in a similar evacuation situation. This further underlines the fact that we on the Norwegian continental shelf must not lose the focus on safety and emergency preparedness, but stress the importance of good maintenance of equipment, training, knowledge and operational participation by the crew concerning well control and evacuation.

Strict requirements relating to pollution of the external environment are important. This is normally consistent with the safety of the crew. However, considering the failure to divert the uncontrolled flow directly to the sea rather than routing it through the mud-gas separator, if it is a question of choosing between saving lives and discharge requirements it must be made clear how environmental requirements should be set aside in an emergency to reduce damage and avoid loss of lives. There is a need to also review this in the Norwegian regulations, as pointed out by the so-called Åm committee in the autumn of 2010.

Conditions on the Norwegian shelf are also different in the sense that the workforce, for the most part, is unionised and that there is a system where employees elect safety delegates who are free to carry out their duties. All major accidents are a result of many factors, which in a given situation can pull in one direction and trigger a catastrophe. The importance of reporting small and major non-compliances, without any consequence for the person reporting or the companies they work for, is of the greatest importance for enhanced safety for individuals and the environment in the broadest sense.

Financial incentives and bonus systems must be toned down in favour of safety and emergency preparedness.

The company culture exposed by the Macondo accident must be fought at all levels.

We agree with the Petroleum Safety Authority Norway's (PSA) conclusions and maintain that, according to the requirements set forth by the PSA, the offshore operations offshore Norway are conducted at an acceptable risk level.

In the subsequent chapters we will review and document our conclusions..

Operational conditions and well safety

In this chapter we will deal with those sections of the reports that concern the operation itself with special emphasis on cementing and the Blow Out Preventer (hereinafter called BOP). In some instances we have found it proper to quote directly from the reports. In those instances a clear page reference is given, while we in other instances have talked about the results without quoting directly.

BOP system

This is a summary of what the different reports say about the role of the BOP in connection with the accident, and the well-control response by the Deepwater Horizon crew.

Det norske Veritas(DNV) report

Description of the BOP and its function in the report but not a direct quote.

The upper part of the BOP is called the lower marine riser package (LMRP), and consists of two annulus valves and two BOP control packages. This part can be disconnected from the BOP and pulled to the surface separately. The lower part consists of five shear rams/pipe rams, as well as valves for circulating mud and formation fluid in and out of the well.

The LMRP control packages receive electrical signals from the control panels on the surface, and these signals activate valves which send hydraulic fluid to the operation of the shear rams/pipe rams, annulus valves and circulation valves on the BOP for disconnecting the BOP/LMRP and to charge a hydraulic bottle bank down on the BOP. This hydraulic bottle bank makes it possible to conduct important operations even if the hydraulic supply from the surface has been cut/lost.

In Norway there is a requirement to be able to acoustically operate certain BOP functions. These functions would then be supplied with hydraulic fluid under pressure from the bottle bank down on the BOP. It is worth noting that the industry's need for subsea engineers for the operation, maintenance and repair of the BOP systems has increased enormously in the last 10 years. The complicated hydroelectric control systems introduced on many new deepwater rigs means that the training of personnel has trailed behind.

The DNV notes that buckling of the drill pipe in the BOP due to the force of the well flow was the probable cause of why the BOP shear ram did not manage to cut and shut in the well flow as it is designed to do. Therefore the drill pipe became located outside the BOP cutting tool and was not covered by the shear ram's shearing surfaces/shearing diameter and could not be centralised by the shear rams.

USCG, USCoastGuard report

Management summary, pages xviii/xix, Safety Systems; Deepwater Horizon and the owner Transocean, had serious failures in their safety management system and a poor safety culture.

Transocean failed to recertify the BOP for over 10 years despite recommendations from the manufacturer and industrial bodies who recommend recertification at 3 to 5 year intervals. Important BOP parts were not replaced according to recommendations. The crew had no training in handling this type of well-control situation, the well flow was thus not diverted and the rig was not disconnected from the well. Important alarm and automatic shutdown equipment was disconnected.

Chapter 1, Explosion,Page 25:

Transocean failed properly to track and maintain Drill floor/shaker electrical equipment in Zone 1 that could have served as an ignition source.

Page 26: The pressure on the BOP control panel on the drill floor had been in bypass for more than five years.

Page 97:

Factors which led to safety system failure; not complying with BOP certification without consulting the manufacturer of the BOP. The actions BP identified in their BOP audit in 2009 were not implemented. "A number of the recommendations that Transocean had indicated as closed out had either deteriorated again or not been suitably addressed in the first instance"; and "In other cases findings were simply rejected, with no formal risk mitigation demonstrated."

This is also in agreement with the PSA's order in May 2007 which states that Transocean does not comply with the maintenance management rules or the handling of unacceptable situations.

Page 111:

Deepwater Horizon and its owner, Transocean, have had serious safety management system failures and a poor safety culture manifested in continued maintenance deficiencies, training and knowledge gaps, and emergency preparedness weaknesses. The company leaders' failure to commit to compliance with the International Safety Management Code created a safety culture throughout its fleet that could be described as: "running it until it breaks," "only if it's convenient," and "going through the motions."

This is best illustrated by the condition based maintenance of the BOP, the deferral of recertification and required maintenance, the bypassing of alarms and emergency shutdown devices, and the conduct of emergency drills. This culture resulted in poor material conditions, ineffective decision making, and inadequate emergency preparedness for responding to catastrophic events.

The task force comments:

This is an incredibly powerful report, it is incredible that Transocean's management team are still in their positions, that they awarded themselves considerable bonuses. And even more incredible that they in 2011 stated that 2010 was the company's best safety year! Probably bonus systems,

based on achieving financial targets, are the main reasons that an organisation has a culture of greed, where safety is set aside and they will literally do anything to achieve the targets and the bonus.

See C-2 in Appendix C, POB lists, the number from each company.

Cementing

Cement is pumped down the well to seal the space between the casing and formation wall to prevent an uncontrolled flow of hydrocarbons on the outside of the casing. When abandoning the well cement is also pumped into the casing to prevent any flow.

In connection with the Macondo well they weighed between using a liner, which would have meant a simpler cementing job, or a long string up to the wellhead. This latter would have been less challenging for safeguarding the well integrity during the well's lifetime. The well was an exploration well which was to be converted to a producer as a commercial reservoir had been discovered. It was finally decided to use a long string, although this would mean a more complicated cementing job.

On the Deepwater Horizon no overall assessment was made concerning the solutions and barriers which could provide the greatest risk mitigating effect and contribute to safeguarding the well integrity. The descriptions in the Chief Counsel's report (2011) show that several solutions were chosen based on the risk of further fracturing of the formation, as the pressure margin at the prevailing well depth had been exceeded. Less volume of cement was pumped down the well than optimum to seal the well and prevent any flow from the reservoir. The cement slurry used was poor and the well's hydrostatic pressure was reduced, resulting in the column of liquids in the well no longer constituted a barrier against influx of hydrocarbons. Pressure tests were carried out in the well for the purpose of verifying that the well integrity had been secured. But when the results were not as expected, the cause was misinterpreted and it was decided to continue to the next stage of the operation.

BP's original well design called for 16 or more centralizers connected along the long string to ensure proper cementing at the bottom of the well. Halliburton advised 21.

In the end only six of these were used due to lack of availability of the favoured type, and to save time, and BP considered this to be adequate.

Before cementing problems were experienced with opening the float-collar valves at the bottom of the long string and more than five times the calculated pressure occurred.

Also a much lower circulation pressure (340 psi) than expected (570 psi) was observed. This was a cause of concern, but it was concluded that it was because of a fault in the pressure sensor.

Because of a fear of further fracturing of the formation the well purging by circulating well fluid was significantly reduced, and it was decided on a very low pumping rate to place the cement, and a low cement volume overall.

This increases the risk of creating cavities and channels in the cement. The use of foam cement was a key technology to reduce the weight and thus the pressure on the formation. The first tests showed that the cement would be unstable under the prevailing reservoir conditions and that nitrogen could thus lead to undesired channels in the cement.

The result of the final laboratory test could indicate that the cement was stable. However, this was only made known to BP after the cementing operation in the well had been carried out.

After a back-flow test it was concluded that the cement was OK. Based on this the logging of the cement quality was cancelled. A pressure test was furthermore carried out by building up pressure in the well. This test did not reveal any leak in the long string. However a further pressure test, where the pressure is gauged down in the well (negative pressure testing), showed anomalies.

The test was repeated by using another sensor and it was concluded that the well was sealed, although the first and primary sensor readings deviated from this. This was explained away and is, together with the failure to log the cement, one of the most significant mistakes that were made when it was finally concluded that the well was safe and the operations could continue.

BP in its procedure for temporary plugging and abandonment of the well included to replace the drilling fluid in the long liner with seawater before setting the upper cement plug. During this operation the BOP would remain open and the cement plug at the bottom of the well would be the only physical barrier between the reservoir and installation. Lack of drilling-fluid pressure above the cement therefore placed heavy demands on the integrity of the cement. Key here is the reliability of the negative pressure test and monitoring of the cement operation.

During the operation to displace the drilling fluid from the long string and riser the operators on board gradually received several indications that something was wrong in the well. Pressure gauges showed abnormal values and there was hectic activity on board, but no visual check of the drilling-fluid volume was made or attempts to shut in the well. Only after the drilling fluid spewed onto the drill floor it was realised that a kick was in progress, and immediately action was taken. At this time gas and reservoir liquids had already reached into the riser above the BOP, which someone unfortunately tried to divert through the diverter system to the drilling fluid and gas separator. The separator did not have capacity to cope with the volumes, which led to gas spreading onto the installation.

The gas was ignited almost immediately resulting in two powerful explosions. A disconnection of the riser from the

BOP, which could have prevented further flow of gas, was not activated or did not work. It was therefore not possible to avert the catastrophe.

Number of centralizers on the long string

The original design called for 16 centralizers on the long riser. Halliburton's calculations recommended 21.

The centralizers ensure that the long riser is centred so that there is the same annulus space around the whole string. This provides for better cementing as there is the same flow around the pipe and there is no risk of the long string lying against the casing/formation on the outside, with lack of cementing and the possibility of leaking channels as a result.

BP only managed to get hold of 6 centralizers of the favoured design. A further 15 were bought, but not of the desired type, as they could lead to problems when running the long string down into the well.

It was decided to only use 6 centralizers, and not the 16 originally planned by BP, nor the 21 recommended by Halliburton.

Testing the foam cement

The geological formation was problematic. In March, the bottom of the well had split and BP was forced to drill a bypass around the problem area. Foam cement was chosen as it is light and would mean less risk of fracturing the formation and loss of cement to the formation during the cementing job. The challenge of using foam cement is that it has a gas phase. If the cement slurry is unstable under the prevailing conditions down in the well, there is a risk that the gas forms channels in the cement instead of creating distributed bubbles. Halliburton therefore performed tests of cement slurries at the conditions that existed in the well. The first tests showed unstable cement. The last test, which could have indicated that the cement slurry was stable, was only completed after the well cementing programme had been completed.

Foam cement was used although it did not appear to be adequately qualified.

Purging and cement rate

Either to save time or because of a fear of further fracturing of the formation the purging of the well by circulating drilling fluid was considerably reduced. This increases the risk of creation of open spaces and channels in the cement, as the drilling fluid can be mixed into the cement. In addition it was decided on a very low cementing rate, and a lower volume of cement. This also poses major challenges in order to obtain good cement quality and to prevent the formation of channels and open spaces.

A limited purging operation was carried out. Also a small cement volume and low cement rate were used.

Cement back-flow test

After cementing it was opened up for the back-flow of cement to test if the plug held.

The cement returning exceeded the calculated volume by approx. 10 %. This was seen as being within the margin of error. What appeared to be the understanding, in the subsequent actions, was that the cement plug was OK.

The result of the back-flow test was seen as a confirmation that the cementing job had been successful.

Cement evaluation (logging)

It was decided not to log the cement and long string after the cementing job. This despite all the challenges and choices made and the fact that the cement barrier to the reservoir would be the only barrier keeping back the reservoir pressure during the next planned operation. This was because the procedure for temporary plugging and abandonment of the well stated that the entire drilling-fluid column in the long riser was to be replaced by seawater before setting a further plug. The planned cement logging was not carried out.

Positive pressure testing

A positive pressure test was conducted by closing the Blind Shear Ram (BSR) in the BOP after the drill string has been pulled out. The volume between the BSR and viper plug on top of the upper float collar at the bottom of the long string is pressurised. The pressure was initially increased by 250 psi and retained for 5 minutes. Then a new test was performed where the pressure was increased to 2,700 psi and retained for 30 minutes. This test verifies that the long string itself and seal assembly in the wellhead are sealed, but does not confirm the integrity of the cement at the bottom and on the outside of the long string.

The test was good.

Negative pressure testing

By carrying out a negative pressure test the integrity of the wellhead, long string, seals and cement at the bottom of the long string is verified. This pressure test is the only method to verify the cement integrity at the bottom of the well. The principle is to reduce the well pressure by replacing drilling fluid with seawater.

The drill string is down in the well to pump in spacer and then seawater. When the BOP annulus valve is closed, the pressure in the well will be much lower than the pore pressure in the formation and one can then test whether there is a leak in the steel casing through the cement plug. Two tests were performed. The first problem was that they did not manage to bleed off the pressure in the drill string down to 0 psi after the BOP was closed.

The pressure rose to 1,400 psi after all the valves had been closed. One also observed that the level in the riser had fallen.

The annulus valve in the BOP was then closed more forcefully to prevent spacer and drilling fluid in the riser from leaking down into the well while the pressure was being bled off. The spacer was not pressed out of the well before closing the BOP using more force. The spacer used by BP consisted of 2 loss-circulation fluids. These are chemicals intended to seal cracks in the formation and avoid loss of drilling fluid and thus over balance in the well. It is unusual to use such loss-circulation fluid for this purpose, and BP was warned that the fluid could clog up nozzles and pipes.

When bleeding down the pressure 0 psi was reached, but the pressure increased again to 773 psi before starting to bleed off again. This is a clear indication of a leak. In addition the volumes that needed to be bled off were much higher than expected, 15 barrels as opposed to 3-4 barrels. However, no one had counted on this, which contributed to the lack of decision-making data.

It was decided to run a new test using the kill line. The drill-string pressure was still 1,400 psi, while the kill line now showed 0 psi, a large anomaly. This may have been because the spacer or drilling fluid in the 3 1/6" pipeblocking and preventing the flow.

The fact that the drill string still had 1,400 psi of pressure was explained away by a "bladder effect", and it was concluded that the cement was intact. The bladder effect was described as drilling fluid above the BOP annulus valve exerting pressure on the annulus which spread and caused excess pressure in the well. Nothing has been found subsequently to support this theory. Also this theory would not have been able to explain the fluid volume bled off or the pressure of 1,400 psi (100 bar) reading observed.

It was concluded that the cement plug was intact, although the test results did not support this.

Organising the work and the emergency situation

In the above we have looked at what caused the blow-out and what might have prevented the situation from getting out of control. Below we will also describe how this probably could have been prevented under a different working method and culture. Below the conditions after the blow-out are described, which led to 11 fatalities, 16 injured personnel and the large spill and ensuing costs for all parties.

There were 126 people on board the Deepwater Horizon when the accident occurred; 6 from the operating company BP, 79 from the rig company Transocean and 41 from different specialist service companies. The table in the Report from the US Coast Guard details the companies who had personnel on board and how many from each company. This report also gives an overview of where the fatalities and injured personnel were and their tasks. Of the 11 fatalities 9 were Transocean employees; 4 were last observed on the drill floor. One was a toolpusher, one a driller and 2 floorhands. Two were driller assistants, one was a derrick hand. One roughneck was in the mud pump room and 1 crane operator was on the crane deck. In addition to the Transocean employees who were killed there were 2 mud engineers from M-I Swaco; they were in the shaker house. All those who died were in the areas where drilling mud and hydrocarbons can flow up from the well. It does not appear that any one of these have attempted to get out, but died on the job. They had most likely not been told to evacuate while they were still alive and could do so. The injured were either affected by the powerful explosions or injured during the evacuation. Also among them the great majority was Transocean employees. Five were in the engine control room which is located outside the "drilling area", these were one chief electronic technician, one chief mechanic, one 1st assistant engineer and 2 motormen. A roustabout was by the port crane, one roughneck was in the gym room and one toolpusher and one division manager were just outside of their offices on the second deck. The other injured personnel were from Art Catering. The baker and one galley hand were in the galley, while one other was in the hallway outside the galley together with a cook. There were also two belonging to the laundry, one in the laundry and one in a cabin. The Joint Investigation Team in the US Coast Guard's report points to certain findings which identify system failures and crew decisions which could have impacted on the explosions and their impact, such as:

Failure to use the diverter line

When the drilling crew directed the uncontrolled well flow through the MGS, the high pressure exceeded the system's capabilities and caused gas to discharge on the Main Deck. Alternatively, the crew could have directed the well flow through a "diverter line" designed to send the flow over the side of the MODU. Although the diverter line also may have failed under the pressure, had it been used to direct the flow overboard, the majority of the flammable gas cloud may have

formed away from the Drill Floor and the MODU, reducing the risk of an onboard explosion.

Hazardous electrical equipment

At the time of the explosions, the electrical equipment installed in the "hazardous" areas of the MODU (where flammable gases may be present) may not have been capable of preventing the ignition of flammable gas. Although DEEPWATER HORIZON was built to comply with IMO MODU Code standards under which such electrical equipment is required to have safeguards against possible ignition, an April 2010 audit found that DEEPWATER HORIZON lacked systems to properly track its hazardous electrical equipment, that some such equipment on board was in "bad condition" and "severely corroded," and that a subcontractor's equipment that was in "poor condition" had been left in hazardous areas. Because of these deficiencies, there is no assurance that the electrical equipment was safe and could not have caused the explosions.

Gas detectors and Emergency Shutdown System

Although gas detectors installed in the ventilation inlets and other critical locations were set to activate alarms on the bridge, they were not set to automatically activate the emergency shutdown (ESD) system for the engines or to stop the flow of outside air into the engine rooms. The bridge crew was not provided training or procedures on when conditions warranted activation of the ESD systems. Thus, when multiple gas alarms were received on the bridge, no one manually activated the ESD system to shut down the main engines. Had it been activated immediately upon the detection of gas, it is possible that the explosions in the engine room area could have been avoided or delayed.

Bypassed systems

A number of gas detectors were bypassed or inoperable at the time of the explosions. According to the chief electronics technician, it was standard practice to set certain gas detectors in "inhibited" mode, such that gas detection would be reported to the control panel but no alarm would sound, to prevent false alarms from awakening sleeping crew members. Similarly, the crew bypassed an automatic shutdown system designed to cut off electrical power when ventilation system safety features failed, possibly allowing flammable gas to enter an enclosed area and reach an ignition source. The chief electrician had been told that it had "been in bypass for five years" and that "the entire fleet runs them in bypass."

Design of the main and emergency power sources

Although the arrangement of main and emergency generators on Deepwater Horizon met IMO MODU Code requirements to have completely independent engine-generator rooms along

within dependent power distribution and control systems, it did not prevent a total failure of the main electrical power system, when the explosions and fire damaged multiple generators and their related power distribution and control equipment. The design did not take into account that the proximity of the air inlets to each other created a risk that flammable gases could impact all six generators at once.

Crew blast protection

Deepwater Horizon did not have barriers sufficient to provide effective blast protection for the crew. Although the barriers separating the Drill Floor from adjacent crew quarters met the standards of the IMO MODU Code, those specifications are only designed to slow the spread of fire, not to resist an explosion. They did not prevent personnel in the crew accommodations area from sustaining injuries.

Command and control

Because of a "clerical error," by the Republic of the Marshall Islands (whose flag of convenience the Deepwater Horizon flew), Deepwater Horizon was classified in a manner that permitted it to have a dual-command organizational structure under which the OIM was in charge when the vessel was latched on to the well, but the master was in charge when the MODU was underway between locations or in an emergency situation. When the explosions began, however, there was no immediate transfer of authority from the OIM to the master, and the master asked permission from the OIM to activate the vessel's EDS. This command confusion at a critical point in the emergency may have impacted the decision on whether to activate the EDS.

Relationship between consideration for the external environment and safety

The focus on preventing small discharges of oil and gas, and the extra costs of bringing chemicals back to shore, can be contributing factors which led to this accident in which 11 people died, 16 were injured and which resulted in enormous spills costing huge amounts of money and with huge consequences.

The reports on this accident point to two important decisions made to safeguard the environment. Both may have contributed to the outcome becoming disastrous.

The most disastrous decision was that the well flow, when the well kick was a fact only minutes before the explosion and fire, was sent through the equipment which is to separate drilling mud, oil and gas to prevent polluting the sea. At that time it should have been obvious to those on the drill floor (who are among those who died) that they had a well completely out of control. Then the well flow must not be connected to the separation equipment but be discharged right into the sea.

After a while, if justifiable, the separation equipment can be activated to reduce any pollution if the well continues to flow. The separation equipment failed, gas and oil went astray and one or more ignition sources led to an explosion and fire. Here the procedures failed, which the report points out. The cause of events and conclusions are well described in the Report to the President, National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, January 2011, chapter 4, page 114 and pages 121 and 122. The procedures of avoiding a smaller discharge to sea may have contributed to the largest oil spill in American history.

The second environment-related decision, which may have had an impact without it being clearly mentioned anywhere, is described in the same report on page 116. M-I Swaco's drilling mud engineers were told by the operator, BP, to use surplus material when mixing the fluid which was to prevent the drilling mud and water to become too much mixed, a so-called spacer fluid. BP did not wish to transport these back to shore owing to the cost of getting rid of them safely. In the US, as in Norway, there is legislation governing this, and therefore chemicals are often injected into wells to get rid of them. The report points out that the volume was unusually large, the mixture had not been tested and no one on the rig or in BP had ever used this mixture for this purpose (see bottom of page 106 in the Report to the President). This is probably not an important factor in the outcome of the accident, but it illustrates how environmental and cost considerations can be put before the use of drilling mud, fluids and chemicals which prevents loss of life. Also on the Norwegian shelf we see that environmental considerations, not thoroughly thought through, can result in unnecessary risk and loss of major assets. The report of the so-called Åm Commission in the autumn of 2010, page 28, concentrates on the possibilities of enhanced value creation. Previous reports concerning drilling and completion have focused on chemicals which make certain operations safer.

Evacuation

On board the Deepwater Horizon there were 126 people at the time of the accident. Of these 115 were evacuated, while 11 died. Of the 115 evacuated 101 were evacuated using conventionally launched lifeboats, 7 in liferafts and 7 saved themselves by jumping into the sea.

A major reason for there not being more lives lost was the good weather conditions, and a standby vessel was alongside the installation and that was able to take on board all the evacuated personnel.

Of those who died 4 were on the drill floor, 4 in the mud pump room, 2 in the shaker room and 1 on the crane deck (US Coast Guard report).

The evacuation itself was extremely chaotic. There is nothing in the existing reports to indicate that there was any systematic search for any survivors. The survivors were only counted after coming on board the standby vessel. It was only then that it was realized that 11 were missing, who were most likely still on board the Deepwater Horizon.

The reports do not answer the question of how many of the 11 who died, did so in the two explosions and ensuing fires. Eyewitness accounts of where they were at the time of the accident, compared with where the explosions occurred, puts them in the blast danger zones..

A lesson to be learnt from the evacuation is that panic and chaos, in such a serious situation which the crew found themselves in, make it almost impossible to conduct an accurate head- count. A further lesson is that many things went wrong during the evacuation. A raft was caught in a rope when being lowered, the raft lacked oars and was caught in a painter, there was no knife to cut ropes etc. These are conditions one does not expect, but they were luckily not critical, mainly because of the good weather conditions.

What would have happened in connection with a similar evacuation on the Norwegian Shelf

Several of the reports point out the good weather conditions at the time of evacuation. Completely calm seas and a water temperature of 71 Degrees Fahrenheit(22 degrees Celsius). There is no doubt that this played a part in the outcome of the evacuation.

101 people were evacuated in the two available lifeboats. Both lifeboats had left the Deepwater Horizon before everyone had arrived at the muster station.

Of those evacuated seven did so by means of a life raft. When waterborne they discovered that they lacked oars, so that several had to jump overboard and swim while they pulled the raft away from the rig. After a while the raft stopped due to the painter being caught. One of the swimmers swam over the standby vessel's rescue boat and got a knife to cut the

painter. The raft was later towed to the standby vessel by the rescue boat.

Seven jumped into the sea from the rig. Some of these were picked up by the rescue boat some via the raft.

What would have happened if a strong gale was blowing straight on the available lifeboats and the watertemperature was 43 degrees Fahrenheit (6 degrees Celsius)? This would be fairly normal on the Norwegian shelf.

Would today's lifeboats have had the necessary engine power to get away from the rig?

What would have happened to the seven who were in the life raft without oars?

What about the seven who jumped into the sea?

Could this have happened on the Norwegian continental shelf?

The report of the Safety Petroleum Authority Norway: Deepwater Horizon accident, evaluations and recommendations for the Norwegian shelf, provides a very good review and must be regarded as very objective. The report points to several possibilities for improvement within:

- Risk management
- Safety culture/management culture/accountability culture/openness culture
- Knowledge and involvement at all management levels
- One-sided focus on economy/costs
- Compliance with regulatory rules and orders

In addition this report raises the question of whistle-blower protection, importance of tripartite cooperation in connection with safety performance and the influence of financial bonuses on the safety culture.

We would like to stress a few specific points in the reports which separate us from the situation on the Deepwater Horizon:

On the Norwegian continental shelf there is a routine to use an acoustic system for activating the BOP. In addition we would like to comment:

- The cementing job would not have been started before there was a final and approved job plan for the job.
- The number of centralizers would have been obtained as stated in the plan, if not it would have been mentioned who was responsible for the nonconformity.
- Employees' competence requirements are a condition for all work on the Norwegian shelf.
- Decisions to stop tasks which can trigger risky situations are encouraged on the Norwegian shelf. "It is better to react

once too often than once too seldom". Difficult in practice but it does not lead to one being fired, if something is stopped which then proves unnecessary. However we are afraid that this "safety valve" is being weakened. That must not happen. We must maintain the pressure for greater and greater acceptance to stop work where there is an impending risk – major accident potential situations must be given greater attention.

We can never rule out that something can go wrong. The circumstances that this will not occur, however, are far greater on the Norwegian shelf, which makes the task force supports the Petroleum Safety Authority's opinion that the risk level in this area is still acceptable on the Norwegian shelf. But there are grounds to review again all sections of the processes.

We support the Petroleum Safety Authority's conclusion that we have an acceptable level of risk, but this requires us putting the safety culture on top of our list. We have a well-established system of high competence standards as well as a strong safety-delegate system; but first and foremost a culture of openness where a whistler-blower culture is encouraged and not punished.

Considering the rapid technological developments we experience we find it reasonable to demand that a management team, even if located in another country, does NOT directly govern the processes at a level and in a manner conflicting with Norwegian rules and regulations and labour agreements. The idea that the oil offshore is the property of the Norwegian people and is to benefit Norway is often not even present in these systems, must always take priority over such ideas.

Presentation of the members of the task force

Knut Nesland

Date of Birth: 08.09.1963 Proposed Position:

Current Position: Svc Leader – Cementing
Languages: Norwegian and English

Oilfield Experience: 21 years Last Updated: 21.03.2006

1998: Trade Certificate, Norway Well Service Trade Test

1984: Stavanger Maritime College, Norway
Petroleum production I Associates

1981: Trade Certificate, Norway Mechanic Trade Test

1981: Bergen Vocational School,
Motor Mechanic I Associates

1980: Rubbestadneset Vocational
School, Norway
Mechanics, basic Associates

OFFSHORE CERTIFICATION / VALID UNTIL
Medical: 07.10.2010 Survival: 22.11.2010

Work offshore:

2000 – Now Halliburton AS Service Leader

Assigned to Snorre A (50%) Earlier assignments: West

Epsilon, TO-Wildcat, TO-Winner, Sleipner A, Deepsea

Trym

1999 – 2000 Halliburton AS Service Supervisor

Assigned to Esso's Jotun B during start-phase.

Performing tool and cementing job on various rigs.

1998 – 1998 Halliburton AS Lead-Off Cementer

Assigned to Statfjord C

1996 – 1998 Halliburton AS Service Supervisor

Assigned to Snorre TLP

Helge Ellingsen

Address :Heiasvingen 15, 4330 Ålgård, Norway

Date of birth: 06.07.1947

Education:

May 1978 – June 1997
Schlumberger.

Various company courses.
Slick Line, Pressure control, Course
in specific equipment.

August 1966 – June 1967
Stavanger Maritime College. Ship mate second class.

Work experience:

May 1963 – February 1978
Th. Brøvig's shipping line, Farsund Norway.

First years as a deckhand. From 1967 as a mate.

From May 1978 until the present time. Schlumberger:
First 19 years as wireline specialist, offshore.
From 1997 full time senior union representative.
Permanent job on the Neddrill Trigon on Saga's
problem well 2/4-14. Has also worked a lot
offshore doing cased hole work, which involved
working with a full set of pressure equipment.

Rolf Wiborg

Date of birth: 23.12.48 in Oslo, Married in 1972
–three children and three grandchildren.

Address: Oscarsgt.19, 4008 Stavanger, Norway.

1972: MSc chemical technology (Siv.ing. Kjemiteknikk)
Norwegian Technical College (NTH). MSc.Petr.
Eng. University of Alberta, Canada 1975

Lead engineer and senior adviser at the Norwegian
Petroleum Directorate since May 2004.

Previous positions at the NPD:
2000-2004: Director advisory section

1997-2000: Resource director

1978-1997: Phillips Petroleum
15 different jobs in Norway and the USA, approx. 8
years working on different platforms, last position
was deputy managing director in Norway.

1989-1991: Responsibility for Phillips' production
operations in the Gulf Of Mexico)

1975-1978: Statoil, jobs on land and
offshore on exploration rigs.

1973-1975: Research Council of
Norway, Continental Shelf Office

1972-1973: Military service.

Rolf Wiborg has sat on and sits on several
professional committees and boards, many of which
are related to research and development. Speaker
at many conferences in Norway and abroad.

Trond Eilertsen.

Senior Drilling superintendant, Statoil.

Education; BSc, Petroleum engineering,
Rogaland Regional College, 1976.

Worked as deckhand, roustabout,
derrickman, service engineer.

Since 1978 worked as, Senior Drilling Supervisor.,
Drilling Superintendent in Statoil.

Worked in Norway, Denmark, Holland,
England, Faroes, Ireland, Canada, US Gulf of
Mexico, Trinidad, Venezuela and Nigeria.

Mainly planning/execution of exploration
drilling on land and offshore, most types of
drilling installations on land and offshore.

Deepwater US Gulf of Mexico,
Nigeria, Faroes and Norway.

Christopher Birknes

Automat. Specialist in BP since 2006

Senior union representative since 2010

Has higher education within HSE culture, labour law,
occupational psychology. Acting national secretary
in the Norwegian union IndustriEnergi since 2009.

Arild Gulestøl

Senior drilling and completion engineer in M-I Swaco

Machine engineer graduate in 1984.

Worked as machine and pipe construction engineer
at shipyards and engineering companies in
Norway. Worked offshore since 1986.

Worked as a drilling mud engineer since 1989. Worked
on the Norwegian shelf and on rigs in the Gulf of Mexico.

Arild Gulestøl also has experience from the
well control incident, P-31, at Snorre A in 2004.
Travelled to the platform after the two drilling
mud engineers on board had been evacuated.

Senior union representative for the IndustriEnergi
union in M-I Swaco since 1994, member
of IE's negotiation team since 1994.

Lars Anders Myhre.

Senior special adviser, IndustriEnergi.

Date of birth 5 July 1942. Married, three

children and nine grandchildren. Address:
Jærgt. 11 A, 4012 Stavanger, Norway.

Graduated upper secondary school, sciences, in 1962.

Military service in the Navy 1962-63

Cand. Mag. From the University of Bergen,
mathematics, geography, geology in 1968

Education (High School) and research assistant
at the University of Bergen 1968-72.

Cand. Real from the University of Bergen in
Marine Geology and Geomorphology in 1972.

Researcher at the Research Council of
Norway, Continental Shelf Office 1973-74

Geologist, responsible for operations geology at
the Norwegian Petroleum Directorate 1974-79.

Leader of the trade union Norsk Olje- og
Petrokjemisk Fagforbund (NOPEF) 1977 – 2000,
full-time position from 1 November 1979.

Member of the Norwegian Confederation of
Trade Unions' secretariat from 1981-

President oil and gas workers section, ICEF- the global
Chemical and Energy Federation of trade Unions.
Following the merger with the mining workers in 1995,
President of the Energy section of the ICEM until 2012.

Spokesman for the oil and gas workers ILOs tripartite
meetings, (ILO = UN's labour organization) since 1977.

Knighted First Class of the Royal Norwegian
Sankt Olavs Orden in 2009.

Jon Arne Mo

Born 16. Feb 1955

Vicepresident IndustriEnergi, area HSE.

Skilled worker, process industry, aluminium.

Main trade union representative Norsk
Hydro, Sunndalsøra, 1995 – 2004

Chemical Workers Trade Union,
Norway, Secretary 2004-06.

Industri Energi, Vicepresident area HSE, from 2006. .

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report are based are:

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the Future of Offshore Drilling**, Report
to the President (381 pages) and
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