



P-180

One of the Key Finding that Related to Cause Accident at Macondo Well (BOP failure)

T.V.S.Nagasravan, UPES

Summary

On the evening April 20, 2010 a well control event allowed hydrocarbon to escape from the macondo well onto deepwater horizon, which results in explosion and fire on the rig. 11 people lost their lives and 17 injured one of the key findings is the BOP emergency mode did not seal the well.

There are 6 possible failures of closing the BSR in emergency mode namely, BSR function, EDS function, AMF, ROV-initiated AMF, ROV-initiated auto shear and ROV-initiated BSR..

Keywords: Emergency Disconnect Sequence (EDS), Automatic Mode Function (AMF)

Introduction

A blow out preventer is a large valve that encases an oil well at surface. Hazardness always there in drilling a well and this can be eliminated by closing the valve (usually operated remotely via hydraulic actuators). The consequences of failure are severe and it leads to loss in millions, human lives and it makes a huge black mark on environment.

Theory and/or Method

Studying the various facts and figures of the Gulf of Mexico blowout. Identifying various reasons contributing for this blowout. This paper focuses on failure of BOP and various factors contributing in this disaster. This report is made on primary data made by the investing team

Examples (Optional)

On the evening April 20, 2010 a well control event allowed hydrocarbon to escape from the macondo well onto deepwater horizon, which results in explosion and fire on the rig. 11 people lost their lives and 17 injured one of the key findings is the BOP emergency mode did not seal the well.

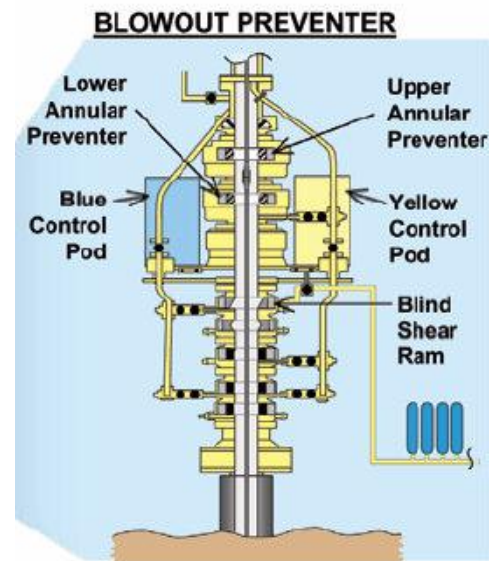


Fig-1: BOP in macondo well

Critical factor in the causal chain of events that contributed to this accident was the failure of the blowout preventer to isolate the wellbore prior to and after the explosions and the fire.



One of the Key Finding that Related to Cause Accident at Macondo Well (BOP failure)

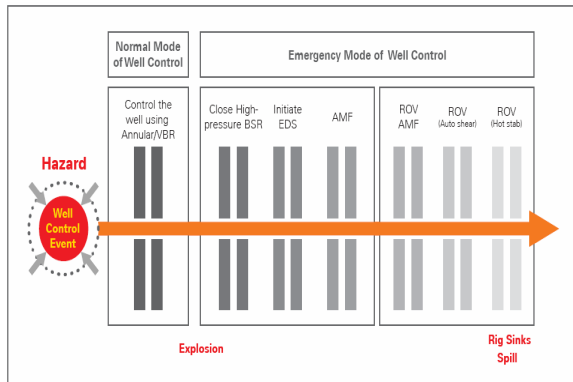


Fig-2: BOP well control modes of operation.

The emergency mode of BOP operation involves the operation of the BSR function to shear the drill pipe and seal the wellbore.

- 1) High – pressure BSR function:
Rig personnel from a control panel on the rig that closes the BSR with high- pressure (4000 psi) hydraulic fluid. These requires at least 1 operational control pod and an associated MUX cable. There is no evidence to suggest that these operations are carried out this emergency mode
- 2) EDS function
EDS was primarily designed to migrate the risk of losing containment as a result of the dynamic positioning system not being able to keep the rig on station. This also requires 1 operational control pod of MUX cable.
- 3) AMF
AMF is designed to mitigate the risk caused as a result of catastrophic failure of the riser of the riser with the resultant reduction of hydrostatic head of mud in the riser to sea water hydrostatic head. This has to be a manually armed by the rig personnel with at least 1 operational control pod. Investigation team concluded that the AMF very likely did not function due to condition of critical components in the control pods.
- 4) ROV-initiated AMF
Closing of High-pressure BSR by using an ROV to cut power/communication and hydraulic lines at the LMRP. This was attempted hours before the Rig

sank. Investigation team again conclude that it did not function because of the critical conditions in the control pods.

- 5) ROV-initiated autoshear
Autoshear is designed to mitigate the risk of loss of containment as a result of and inadvertent disconnect of the LMPR from the BOP stack. This was attempted hours before the rig sank and it failed to seal the wellbore
- 6) ROV-initiated BSR
This function requires sufficient hydraulic power available from the ROV pump or bank of accumulators. Various attempts are made to close the BSR prior to the rig sank, but all the attempts are failed to seal the well bore.

Conclusions

There are 6 possible failures of closing the BSR in emergency mode namely, BSR function, EDS function, AMF, ROV-initiated AMF, ROV-initiated auto shear and ROV-initiated BSR. These are made on the bases of limited data. This also makes the questions on the drilling crew on the platform, and their role and responsibilities in their work.

References

Deep water horizon Accident Investigation Report

Crutis F.Kruse., "ROTARY DRILLING BLOWOUT PREVENTION", third Edition.,

www.blowout-preventer.com