PREVENTION AND CONTAINMENT OF DEEPWATER OIL WELL BLOWOUTS

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Situation and Problem

Deepwater (depths greater than 1500 ft) offshore operations with a potential blowout possibility initiating at the wellhead that contains the Blowout preventer (BOP). The BOP is present at the seabed and is connected to a riser pipe above it, and to the wellbore below it. Riser pipe connects BOP to oil platform. A blowout could pose a significant risk to human lives, environment, and material assets [1].

An important case study in this project was the Deepwater Horizon blowout. Solutions proposed are substantially influenced by the incident. The project addresses the following critical questions:

- What improvements can be made to an existing system to prevent the occurrence of a blowout or reduce risks to ALARA?
- What measures must be taken in case a blowout occurs?

References

[7] "BOP Capping stack placed on standby ready to be used if blowout occurs.
- Capping stack equipped with nitrogen gas and methanol pumps
- Capping stack may take from a few hours to 48 hours to be attached depending on blowout conditions.

Containment

BOP Capping stack

- Dual relief wells drilled in to depths of 14,000-18,000 ft. to intercept blown-out well
- Relief well pipes pump mud and cement to permanently seal off well [7]

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Improvement of BOP

- Addition of an extra shear ram
- Better shear ram material: TiC
- Drill pipe centralization system
- Manual control by remotely vehicles

Are the solutions feasible?

Cost-Benefit analysis suggests that solutions are feasible as they are minor improvements. Solutions are also not time consuming as they are installed prior to the BOP installation.

Figure 1: Deepwater wells depths and locations [2]
Figure 2: BP oil spill top view [3]
Figure 3: BOP structure [4]
Figure 4: Relief well [6]