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


Prevention

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

Improvement of Riser
- Flow monitoring system in riser
- Riser dismantling system from platform

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.

Containment

BOP Capping stack
- 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

Relief wells
- 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]

Are the solutions feasible?
Relief wells are the safest solution to kill the well. Cost-Benefit analysis is acceptable, but drilling the wells is time consuming. Capping stack can be used as a temporary solution while the wells are being drilled.