MANAGED PRESSURE DRILLING FOR OPTIMIZING DEEPWATER AND HIGH PRESSURE - HIGH TEMPERATURE OPERATIONS IN INDONESIA

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ABSTRACT

The drilling of deepwater and high pressure – high temperature (HPHT) drilling prospects in Indonesia involves a higher level of risk compared to conventional drilling operations. The exposure from deepwater and HPHT wells from hazards such as an influx in oil-based mud and gas expansion in the riser or narrow mud weight windows are common in these types of environments. To help ensure that well construction operations in these critical wells are run safely and efficiently, additional safeguards in the form of advanced drilling techniques and equipment utilization are required.

By utilizing Managed Pressure Drilling (MPD) equipment, such as a Rotating Control Device (RCD) and an automated MPD choke manifold, and by employing MPD techniques, such as Constant Bottomhole Pressure (CBHP) and Pressurized Mud Cap Drilling (PMCD), surface backpressure can be exerted and relieved in a controlled manner during drilling to be able to minimize non-productive time.

This paper will provide information on recent operations involving deepwater MPD and HPHT operations in Indonesia, as well discuss improvements to the technology and its methodology that will allow it to optimize and further expand its range of applications.

INTRODUCTION

International Association of Drilling Contractors (IADC) defines Managed Pressure Drilling (MPD) as “an adaptive drilling process used to precisely control the annular pressure profile throughout the wellbore.” The objectives are to ascertain the downhole pressure environment limits and to manage the annular hydraulic pressure profile accordingly.

In a simplified term, MPD will assist to handle and control pressure in the wellbore. To achieve this, several different techniques and equipment are required. The two main equipments required are Rotating Control Devices (RCD) and Choke Manifold which can be manual, semi-automatic, or fully automated. Throughout the years, technology has been growing fast and fully automated choke manifold are now commonly being used in the industry, where PLC, sensors, and advanced programming are being utilized. The development of the technology into the MPD equipment has optimized the efficiency of MPD operations in the Deepwater and HPHT arena.

In addition to the high technology of equipment mentioned above, MPD where also it is also known as Closed-loop drilling (CLD) systems, allow drilling operations to be executed in a closed pressurized environment instead of conventional drilling technique where drilling fluid returns to open atmosphere. Figure 1 shows a simplified process of Closed-loop drilling (CLD). In Indonesia, Deepwater MPD was recently conducted and proven to be successful onboard of a dynamic position drillship. MPD techniques of constant bottom hole pressure (CBHP) as well as pressurized mud cap drilling (PMCD) and deepwater MPD equipment was utilized during drilling operation as well as during wireline logging. Without MPD, the wells would not have been able to be drilled safely to TD. Also, a recent HPHT MPD operations in was completed onboard of a jack up rig offshore of Indonesia. Several attempts