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ANALISIS EFISIENSI PENANGGULANGAN LOST CIRCULATION DENGAN METODE KONVENSIONAL DAN UNDER BALANCED DRILLING PADA FORMASI KUJUNG BLOK Z

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Abstract

This study will analyze the efficiency of conventional methods and Unbalanced Drilling (UBD) in addressing lost circulation in Kujung Block Z formation. Lost circulation is one of the major challenges in drilling operations that can lead to operational risks and increased costs. This study compares the effectiveness of the two methods based on operational parameters such as rate of penetration (ROP), drill bit load (WOB) and formation pressure stability. The results of this study show that the UBD method is more effective in suppressing lost circulation compared to conventional methods, especially under extremely low formation pressure conditions.

Keywords: *lost circulation, Unbalanced Drilling, conventional methods, drilling efficiency, Kujung formation.*

1. Introduction

Oil and gas drilling has faced several challenges for technicians; One of them is the loss of circulation or leakage of drilling fluid into the formation(Aadnoy,2010). This problem can result in increased operational costs and longer drilling times(Bourgoyne,1986). Therefore, choosing the right method to overcome this loss of circulation is also very important to increase the efficiency and success of drilling operations(Ariyani et al., n.d.). Various methods have been developed to overcome lost circulation, including the traditional method using plug materials and the UBD method which can reduce the level of hydrostatic pressure in the formation(Adams,1985). Although this traditional method is still widely used, the UBD method also offers advantages in maintaining pressure stability and reducing the risk of fluid loss significantly.(Ariyani et al., n.d.) The purpose of this study is to evaluate and compare the effectiveness of conventional methods with UBD in overcoming lost circulation in the Kujung Block Z formation. By using this field data and operational parameter analysis, this study is expected to provide the best recommendations in choosing a method to overcome lost circulation(Program Studi Teknik Industri et al., 2022). In addition, this study also always considers economic factors in the application of each method(Rabia,1986)'. A more efficient method not only reduces lost circulation but also reduces overall operational costs(Mitchell,2011). Therefore, cost analysis is an important part of this study(Jalisar Belo et al., 2025). On the other hand, the success of this method also depends heavily on geological conditions and formation characteristics(Grace,2003). Formations with low pressure tend to be more suitable for the UBD method, while formations with high pressure may be more effective with conventional methods that will use certain plugging materials (Susanto & Rasminto, n.d.).

2. Methods

In this study, a case study approach was conducted on a well in the Kujung Block Z formation. Operational data such as penetration rate, formation pressure, and fluid loss were collected and analyzed to assess the effectiveness of each method. This study also used a combination of quantitative and qualitative methods to obtain comprehensive results. The first step taken in this study was to collect data from previous drilling reports that recorded lost circulation events. Furthermore, a comparison was made between the conventional method and UBD and then considering factors such as formation type, formation pressure, and the use of plugging materials in the conventional method. Analysis of this data was also carried out by comparing performance parameters between the two methods, such as efficiency in reducing fluid loss, pressure stability, and its impact on penetration rate and drilling time. The results of this analysis were also used to determine the most effective method under certain conditions. In addition, this study also used numerical modeling to simulate the effects of the ripple method on formation pressure and well stability. This simulation was carried out using software based on calculations on pressure and fluid distribution in the well. To ensure the validity of the data, a comparison was made between field data and simulation results. The differences between field results and simulation results were analyzed to see the possibility of external factors that could affect the effectiveness of the method used.

3. Result and Discussion

The results of this study indicate that the UBD method has a higher success rate in overcoming lost circulation compared to conventional methods. In low to medium formation pressure conditions, the UBD method is able to significantly reduce fluid loss by controlling hydrostatic pressure and minimizing disturbances to the formation.

In conventional methods, although still effective in some cases, they still have limitations, especially in formations with high permeability. The use of plugging materials often does not provide optimal results and requires repeated applications, which ultimately results in losses due to increased operational costs. On the other hand, in terms of operational efficiency, the UBD method also shows advantages in increasing penetration rates and reducing overall drilling time. Thus, the application of the UBD method can be a more effective and economical solution in dealing with lost circulation under certain conditions. Furthermore, the results of this study also show that the UBD method can improve work safety during drilling operations. Thus, more controlled pressure, the risk of blowout or loss of well control can also be minimized compared to conventional methods that often rely on plugging materials. In addition to the technical aspects of safety and others, environmental factors are also considered in this study. The use of the UBD method can reduce the consumption of chemical plugging materials that can pollute the environmental area, UBD is a more environmentally friendly alternative compared to conventional methods.

Here I will attach the location of Block Z The well that is the object of research in this final assignment is located in Offshore Block Z, which is located in the East Java Basin. Geographically, this location is located in the southern part of Banjarmasin and northeast of Madura Island. Specifically, the coordinates of the Y well are 5° 37' 45.9759" S and 115° 31' 16.0546" E. For the exploration well studied in this study is the "Y" drilled well, with a reference from the "X" well which is about 2 km away. The main target in this drilling is the Kujung Formation, which is estimated as a potential reservoir rock. The Kujung Formation has an upper limit at a depth of 5,920 feet and is the main focus of drilling in Block Z.

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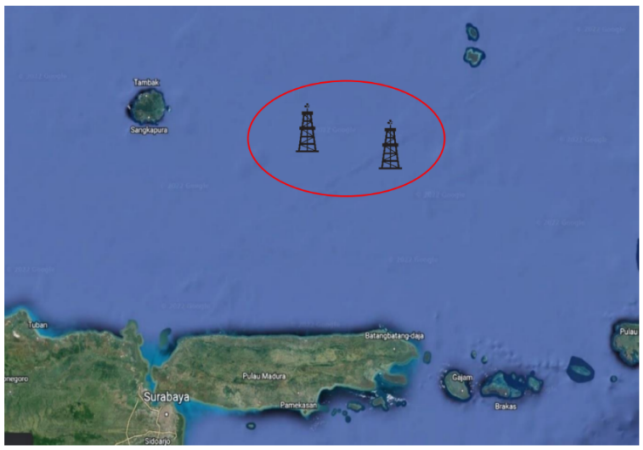

Figure 1. Lokasi Lapangan Penelitian

The images and data presented above illustrate the geological and operational conditions of the wells studied. Based on the analysis conducted, the UBD method has proven to be more effective than conventional methods in handling lost circulation in the Kujung Block Z formation. In addition, the results of this study provide insights that will be used as a reference in choosing a more efficient and economical drilling method in the future. Decisions in implementing this method must consider various technical, economic, and environmental factors in order to provide optimal results. With this research, it is expected to contribute to the development of more advanced drilling technology and be able to overcome operational challenges more effectively.

4. Conclussion

Based on the research results, it can be concluded that the UBD method is more effective in handling lost circulation compared to conventional methods. The advantage of the UBD method lies in its ability to control pressure on the formation and reduce fluid loss without requiring the use of additional plugging materials. Although this conventional method can still be used under certain conditions, its limitations in handling formations with high permeability make it less efficient than the UBD method. Therefore, the selection of this lost circulation control method must consider the characteristics of the formation and the existing pressure. For further research, it is recommended to explore the development of more efficient UBD technology and examine additional factors that can affect the effectiveness of this method in various well conditions.

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