

RINGKASAN

FORMULASI *DOUBLE SALT HIGH PERFORMANCE WATER BASED MUD* UNTUK MENGATASI *SHALE PROBLEM* PADA SUMUR “KAO-12” LAPANGAN “LM”

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Sumur “KAO-12” merupakan sumur pengembangan dengan tekanan maksimal 3000 psi, temperatur 350°F. Operasi pemboran pada trayek 8 ½” sumur ini rencananya akan menggunakan *high performance water based-mud* dengan menambahkan *polyamine* pada *KCl Polymer*. Namun harga KCl cukup mahal terlebih lagi akan sangat boros bila digunakan pada sumur pengembangan yang memiliki tipe *clay* yang tidak *fully smectite*. Dalam upaya mengurangi total biaya yang akan dikeluarkan dalam operasi pemboran Sumur “KAO-12” penelitian ini dilakukan untuk memformulasikan *double salt high performance water-based mud* dengan mengombinasikan KCl dan NaCl sebagai alternatif menggantikan *single salt high performance water-based mud*.

Dalam mengetahui tingkat keberhasilan formulasi ini, analisis dilakukan dengan membuat 4 sampel lumpur dengan persentase garam yang berbeda dimana sampel 1 dengan formulasi 8% KCl 2% *Polyamine*, sampel 2 dengan formulasi 6% KCl 2% NaCl 2% *Polyamine*, sampel 3 dengan formulasi 4% KCl 4% NaCl 2% *Polyamine*, dan sampel 4 dengan formulasi 2% KCl 6% NaCl 2% *Polyamine*. Setiap sampel akan digunakan dalam beberapa pengujian yang terdiri dari pengujian sifat fisik lumpur dan *shale study* lalu dilanjutkan dengan perhitungan ekonomi sebagai parameter terakhir dalam menentukan sampel yang paling optimal untuk digunakan pada pengeboran sumur “KAO-12”.

Berdasarkan hasil pengujian *properties*, *shale study*, dan analisa keekonomisan terlihat bahwa sampel 3 dengan formulasi 4% KCl 4% NaCl 2% *Polyamine* memiliki performa yang paling optimal dengan nilai n sebesar 0,675 dan nilai K sebesar 0,9690 $\text{lb-sec}^{-n}/100 \text{ ft}^2$, % *accretion* sebesar 4,5%, % *dispersion* sebesar 37,6% dan % *swell* sebesar 12,9%, dan dapat menghemat total biaya hingga \$6.226, 65 atau dalam Rupiah sebesar Rp. 101.351.18 bila dibandingkan dengan menggunakan *single salt high performance water-based mud* pada Sumur “KAO-12”.

Kata Kunci: *High Performance Water Based Mud, Shale Study, NaCl Mud*

ABSTRACT

FORMULATION OF DOUBLE SALT HIGH PERFORMANCE WATER BASED MUD TO OVERCOME SHALE PROBLEM IN "KAO-12" WELL OF "LM" FIELD

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The "KAO-12" well is a development well with a maximum pressure of 3000 psi, temperature 350°F. The drilling operation in the 8 ½" trajectory of this well is planned to use high performance water based-mud by adding polyamine to KCl Polymer. However, the price of KCl is quite expensive, moreover, it will be very wasteful when used in development wells that have clay types that are not fully smectite. In an effort to reduce the total cost to be incurred in the drilling operation of Well "KAO-12", this research was conducted to formulate double salt high performance water-based mud by combining KCl and NaCl as an alternative to replace single salt high performance water-based mud.

In order to determine the success rate of this formulation, the analysis was conducted by making 4 mud samples with different salt percentages where sample 1 with 8% KCl 2% Polyamine formulation, sample 2 with 6% KCl 2% NaCl 2% Polyamine formulation, sample 3 with 4% KCl 4% NaCl 2% Polyamine formulation, and sample 4 with 2% KCl 6% NaCl 2% Polyamine formulation. Each sample will be used in several tests consisting of testing the physical properties of mud and shale study and then continued with economic calculations as the last parameter in determining the most optimal sample to be used in drilling the well "KAO-12".

Based on the results of properties testing, shale study, and economic analysis, it can be seen that sample 3 with the formulation of 4% KCl 4% NaCl 2% Polyamine has the most optimal performance with an n value of 0.675 and a K value of 0.9690 Ib-sec-n/100 ft², % accretion of 4.5%, % dispersion of 37.6% and % swell of 12.9%, and can save total costs up to \$6,226.65 or in Rupiah of Rp. 101,351.18 when compared to using single salt high performance water-based mud in the "KAO-12" Well.

Keywords: High Performance Water Based Mud, Shale Study, NaCl Mud