

RINGKASAN

Sumur H-07 adalah sumur vertikal yang terletak di Lapangan DEWA, Cekungan Jawa Timur Utara. Pada saat melakukan operasi pemboran menggunakan *flow rate* pompa 350 gpm pada trayek 8 ½”, terjadi penurunan laju penembusan yang diduga karena banyaknya *cutting* yang mengendap pada *bit*. Indikasi ini jika dibiarkan secara terus menerus akan menyebabkan kerugian dalam biaya operasional dan *problem* pemboran seperti *bit balling*, oleh karena itu perlu diadakan optimasi pengangkatan *cutting* pemboran pada trayek 8 ½”.

Perhitungan optimasi *lifting capacity* dimulai dengan mengumpulkan data sifat fisis lumpur pemboran yang terdiri dari *flow rate* pompa, densitas lumpur pemboran dan data formasi yang terdiri dari densitas *cutting*, diameter *cutting*, serta profil sumur. Penelitian ini terbagi pada tiga (3) Area Trayek 8 ½”, yaitu Area 1 (*Inside Diameter Casing – Drill Pipe*), Area 2 (*Open Hole – Drill Pipe*), Area 3 (*Open Hole – Drill Collar*). Langkah selanjutnya adalah menghitung kecepatan aliran fluida di *annulus*, menghitung *Reynold Number* untuk menentukan tipe aliran fluida, viskositas efektif untuk menghitung kecepatan turun serbuk bor, dan *lifting capacity* dengan menggunakan lima (5) *flow rate* yang berbeda. *Flow rate* pompa yang digunakan untuk evaluasi adalah sebesar 350 gpm, 400 gpm, 450 gpm, 500 gpm, dan 550 gpm. Kemudian dilakukan perbandingan nilai *lifting capacity* berdasarkan *flow rate* pompa yang digunakan dalam optimasi. Perhitungan angka *lifting capacity* dikatakan efektif (optimum) jika lebih besar atau sama dengan 90%.

Penelitian ini menghasilkan besar nilai *lifting capacity* pada Area 1 dengan menggunakan *flow rate* pompa 350 gpm sebesar 87,69%, Area 2 sebesar 89,11%, Area 3 sebesar 92,42%. Pada *flow rate* pompa 400 gpm nilai LC Area 1 sebesar 89%, Area 2 sebesar 90,27%, dan Area 3 sebesar 93,23%. Pada *flow rate* pompa 450 gpm nilai LC Area 1 sebesar 90,04%, Area 2 sebesar 91,19%, dan Area 3 sebesar 93,87%. Pada *flow rate* pompa 500 gpm nilai LC Area 1 sebesar 90,89%, Area 2 sebesar 91,94%, dan Area 3 sebesar 94,39%. Pada *flow rate* pompa 550 gpm nilai LC Area 1 sebesar 91,59%, Area 2 sebesar 92,56%, dan Area 3 sebesar 94,83%. Berdasarkan hasil perhitungan, maka didapatkan kesimpulan bahwa *flow rate* pompa 450 gpm didapatkan nilai *lifting capacity* yang optimum pada ketiga Area dan aman untuk operasi pemboran, hal ini menandakan bahwa semakin besar *flow rate* pompa maka semakin efektif *cutting* yang terangkat.

Kata kunci : Lumpur pemboran, *cutting*, *Lifting Capacity*, *flow rate*

ABSTRACT

Well H-07 is a vertical well located in the DEWA Field, North East Java Basin. When performing drilling operations using a pump flow rate of 350 gpm on the 8 1/2" route, there was a decrease in penetration rate which was suspected to be due to the large amount of cutting that settled on the bit. This indication, if left unchecked, will cause losses in operational costs and drilling problems such as bit balling. Therefore, it is necessary to hold an evaluation of the lifting of drilling cutting on the 8 1/2" route.

The lifting capacity optimization calculation begins by collecting data on the physical properties of drilling mud consisting of pump flow rate, drilling mud density, formation data consisting of cutting density, cutting diameter, and well profile. This study is divided into three (3) Areas on the 8 1/2" route, namely Area 1 (Inside Diameter Casing – Drill Pipe), Area 2 (Open Hole – Drill Pipe), Area 3 (Open Hole – Drill Collar). Once the data is collected, the next step is to calculate the fluid flow velocity in annulus, calculate the Reynolds Number to determine the fluid flow type, the effective viscosity to calculate the drill powder drop rate, and the lifting capacity using five (5) different flow rates. Flow rate of the pump used for evaluation is 350 gpm, 400 gpm, 450 gpm, 500 gpm, and 550. After obtaining the lifting capacity figure, then a comparison of the lifting capacity value based on the flow rate of the pump used in the evaluation was carried out. In the calculation, the lifting capacity figure is said to be effective (optimal) if it is greater than or equal to 90%.

This study produced a large value of lifting capacity in Area 1 by using a pump flow rate of 350 gpm of 87,69%, Area 2 of 89,11%, and Area 3 of 92,42%. At the flow rate of the 400 gpm pump, the LC value of Area 1 is 89%, Area 2 is 90,27%, and Area 3 is 93,23%. At the pump flow rate of 450 gpm, the LC value of Area 1 is 90,04%, Area 2 is 91,19%, and Area 3 is 93,87%. At the flow rate of the 500 gpm pump, the LC value of Area 1 was 90,89%, Area 2 was 91,94%, and Area 3 was 94,39%. At the pump flow rate of 550 gpm, the LC value of Area 1 is 91,59%, Area 2 is 92,56%, and Area 3 is 94,83. Based on the results of the evaluation calculations, it was concluded that the pump flow rate of 450 gpm obtained a Lifting Capacity value that was effective in the three areas and efficient for the company's operational costs. This indicates that the greater the pump flow rate, the more effective the cutting will be lifted.

Kata kunci : *Drilling Fluid, cutting, Lifting Capacity, flow rate*