

The Effect of Coconut Fibres, Banana Trunk Peel and Baggasse on the Lost Circulation of the Drilling Mud

(Pengaruh Serabut Kelapa, Kulit Batang Pisang Dan Ampas Tebu Pada Kehilangan Sirkulasi Lumpur Pemboran)

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Abstract

Lost Circulation Materials (LCM) are specially designed not to damage the penetrating formation during handling of loss circulation problems and are very effective for drilling operations worldwide. Optimization of LCM composition may stop loss circulation effectively and protect the production zone from the invasion of mud filtrate. The concentration of lost circulation materials (LCM) is a key parameter to determine the effectiveness of LCM. In this study, laboratory equipment such as the Hamilton beech mixer, Fann VG meter and API filter press are used to evaluate the effectiveness of various LCMs in dealing with loss circulation. In this research, coconut fibre, banana tree skin, and bagasse are used as LCM in various concentrations. The mud losses were simulated using an 80 mesh shaker. The quality of the muddy rheological properties was the basic parameters to be evaluated. The test was carried out at 80°F and 200°F. The experimental results show that bagasse has the best performance both at 80°F and 200°F as LCM compared with coconut fibres and banana trunk. The lost circulation of mud filtrate at 80°F and 200°F due to the addition of 2 gram bagasse is 34 ml and 40 ml, respectively.

Keywords: Lost Circulation Materials, Coconut Fibres, Baggasse, Banana Trunk

Sari

Lost Circulation Materials (LCM) dirancang khusus agar tidak merusak lapisan batuan yang ditembus pada saat penanggulangan masalah loss circulation dan cara ini sangat efektif untuk operasi di seluruh dunia. Optimasi komposisi LCM dapat menghentikan kehilangan sirkulasi secara efektif serta melindungi zona produktif dari invasi filtrat lumpur. Konsentrasi Lost Circulation Materials (LCM) merupakan parameter utama untuk menentukan keefektifan dari LCM. Dalam penelitian ini, peralatan-peralatan laboratorium seperti Hamilton beech mixer, Fann VG meter dan API filter press digunakan untuk mengevaluasi keefektifan dari berbagai macam LCM dalam menangani loss circulation. Pada penelitian ini serabut kelapa, kulit batang pisang dan ampas tebu digunakan sebagai LCM pada berbagai konsentrasi. Kehilangan lumpur disimulasikan dengan menggunakan shaker berukuran 80 mesh. Kualitas sifat reologi lumpur inilah yang akan menjadi paramater dasar untuk dievaluasi. Pengujian akan dilakukan pada suhu 80°F dan 200°F. Hasil percobaan memperlihatkan bahwa ampas tebu mempunyai kinerja terbaik pada 80°F dan 200°F sebagai LCM dibandingkan serabut kelapa dan kulit batang pisang. Kehilangan sirkulasi filtrate lumpur pada 80°F dan 200°F berkenaan dengan penambahan 2 gram ampas tebu berturut-turut adalah 34 ml and 40 ml.

Kata-kata kunci: Lost Circulation Materials, Serabut Kelapa, Ampas Tebu, Batang Pisang

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I. INTRODUCTION

Loss Circulation is a problem that often occurs in drilling operations, namely the migration of drilling fluid into the formation. Drilling by penetrating formations that have large permeability, large fractures and areas with low pressure, resulting in a partial and even partial loss of formation fluid, loss circulation is a very difficult challenge, because it can cause cost overruns and time to handle it (Adam, 1985). As explained earlier, loss circulation is a problem that is troublesome and requires a large amount of money in handling it in this industry. The classic problem in drilling penetrates large cracks, low

pressure and large permeability is not only difficult but also expensive and risky. Migration / invasion occurs in cavernous, hollow (vugular) formations, unconsolidated fractures or rocks. In dynamic conditions, the fluid migration process increases, this condition is due to the large pressure difference between formation pressure and hydrostatic pressure, decreasing the viscosity value due to the effect of voltage and thinning of the mud cake due to trip in - trip out and circulation. There are many studies to overcome the problem of loss circulation.

In research, several materials such as bagasse, cocout fibres, and banana trunk were used as LCM. The effect of each material on mud slurry rheology

was tested.

II. LITERATURE REVIEW

Until now, the drilling industry has developed Underbalanced Drilling (UBD) technology, this technique is used because it has the advantage of reducing formation damage and minimizing loss circulation problems, but in this case UBD techniques require special equipment and trained crew, so that costs are needed. big and always updated technology (Perez-Tellez, 2002). Drilling mud is one of the main components that determine the smoothness and success of a drilling operation. The sludge system used in a drilling operation must be in accordance with the conditions of formation and lithology that must be penetrated (Adam, 1985). There are two main problems that occur in loss circulation, namely invasion / migration and large fractures. Loss circulation can be classified into three parts, namely seepage loss (1-10 bbl / hr), partial loss (10-500 bbl / hr), total / complete loss (over 500 bbl / hr) (Rabia, 1985). Coconut fibres as biosorbents to remove heavy metals from the waters are quite high because coconut fibers contain lignin (35% - 45%) and cellulose (23% - 43%) (Carrijo, 2002). Fiber from banana stems comes from banana plants that have been cut down for the fruit is taken and is an agricultural waste that has not been widely used. Banana stem fiber is one source of fiber that has a source of fiber that has a high cellulose content. Banana stem has a specific weight of 0.29 gr / cm³ and fiber length 4.2-5.0, 46 mm and lignin content of 33.51%, (Husin, 2007). Baggasse bagasse mostly contains ligno-cellulose. The fiber length is between 1.7 to 2 mm with a diameter of about 20 μ m, so that the bagasse can meet the requirements for being artificial boards or for other purposes. Bagasse contains 48 - 52% water, average sugar 3.3% and average fiber 47.7%. Bagasse fiber is insoluble in water and consists mainly of cellulose, pentosan and lignin [3].

III. METHOD

The laboratory study used a mud which was based on fresh water (Water Based Mud). The composition of the drill mud as well as the properties of mud is very influential on drilling. Casing planning, drilling rate and completion are influenced by the drill mud which is used at that time. For example in areas with soft rocks, controlling the nature of mud is very necessary. But in areas with hard rock these properties are not too critical so that water can sometimes be used. It can be said that the geological properties of an area also determine the type of mud to be used. Various additives are intentionally added to the mud to produce certain properties needed to carry out their functions. Drill mud must be thixotropic which is

runny (liquid) when stirred or pumped and if the mixture / pump stops the mud will form gelatinous properties (gel). This property is required if the circulation is stopped due to pump damage, for example, the cuttings remain propped up not to the bottom of the well and cause the pipe to be pinched or re-formed (regrinding) which will become a clot in the bit (bit balling). In the laboratory testing, rheology determination was obtained and observed in reading the equipment used during the study, including Mud Balance, Fann VG Meter, API Filter Press, Hamilton Mixer, an 80 mesh filter and other supporting equipment. A mud which composed water volume of 341.22 ml, Bentonite of 22.5 grams and Caustic Soda of 0.5 gram was made. Then experiments were conducted to determine the rheological properties as given in Table 1. The research referred to API 13B-1 [2].

Table 1. Basic Mud Rheology

Mud Properties	
Additif (gram)	0
Density (ppg)	8,6
Viscosity (dtk/cc)	83
PV (cps)	10
YP (lbs/sqft)	40
GS 10sec (lbs/100 ft ²)	30
GS 10mnt (lbs/100 ft ²)	35
API water loss 30 min, 100 psi (cc)	11,8
Mudcake (min)	0,5
pH Filtrate	9,5
Lost circulation (ml)	210

IV. RESULTS AND DISCUSSION

Continuous testing of fresh water-based mud with the addition of the number of additives was testing. The additives used were coconut fibers, bagasse pulp, and banana tree skin with each composition (gram) 0 gram, 0.5 gram, 1 gram, 1.5 gram, and 2 gram at a room temperature of 80°F and mesh size of 80.

Tables 2 and 3 show lost circulation by adding 2 gram LCM additive at 80°F and 200°F. The tables show that have a minimum value of Water / Fluid loss on temperatures of 80°F and 200°F. This means that bagasse is the most effective LCM compared with coconut fibres and banana trunk. The complete experimental results are shown in Figures 1 and 2.

Figures 1 and 2 indicate that the addition of additives such as coconut fibers, bagasse and banana tree peels into basic mud is able reduce the mud filtrate. In this case, coconut fibers, bagasse and banana tree peels have a function as lost circulation materials (LCM) at temperature 80°F

and 200°F. Other information obtained from the figures is bagasse has the highest performance dealing with lost circulation compared with coconut fibers and banana tree peels both at temperature at 80°F and at 200°F. Figures 1 and 2 indicated that coconut fibres are more effective to handle lost circulation than banana trunk peels at 80°F but they are less effective at 200°F.

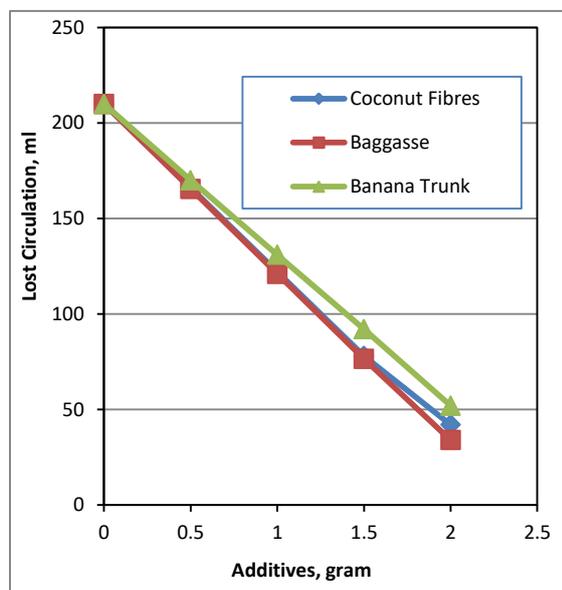


Figure 1. Compositions of Baggasse, Coconut Fibres, Banana Trunk Additives for Lost Circulation in 80°F

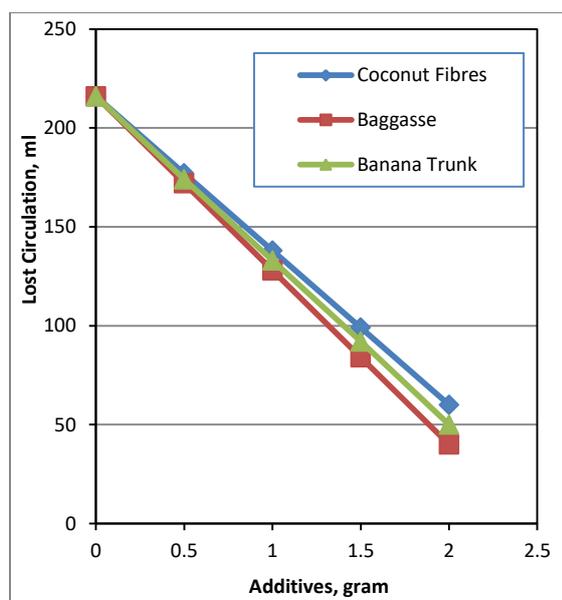


Figure 2. Compositions of Baggasse, Coconut Fibres, Banana Trunk Additives for Lost Circulation in 200°F

Table 2 Lost Circulation at 80°F

No.	Additives	Lost Circulation, ml
1	Coconut Fibres (2 gr)	42
2	Baggasse (2 gr)	34
3	Banana Trunk (2 gr)	52

Table 3 Lost Circulation at 200°F

No.	Additives	Lost Circulation, ml
1	Coconut Fibres (2 gr)	60
2	Baggasse (2 gr)	40
3	Banana Trunk (2 gr)	50

IV. CONCLUSIONS

During this study, the performance of coconut fibers, bagasse and banana tree peel was tested as lost circulation materials (LCM) in drilling water based on freshwater. The difference in concentration / composition of coconut fibers, bagasse and banana tree peel uses 80 mesh pore sandy media. The observations have been analyzed so that conclusions can be drawn as follows:

1. Coconut fibres, bagasse, and banana trunk have a function as lost circulation method, since they are able to reduce the lost circulation volume of freshwater based mud.
2. Baggasse is the best additive compared with coconut fibres and banana trunk, since it resulted in lowest lost circulation volumes for various additive concentrations and temperatures of 80°F and 200°F.
3. Increasing the amount of concentration/ composition of additives (coconut fibers, bagasse and banana trunk) from 0.5 gram to 2 grams both at temperature of 80°F and 200°F will further reduce the volume of lost circulation. The smallest mud filtrate loss obtained by adding 2 gram bagasse into mud slurry which is 34 ml and 40ml at 80°F and 200°F, respectively.

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