INTRODUCTION

- Encountered when drilling into cavernous, vugular, high permeability, naturally fractured formations, and Drilling Tensile Induced Fracture (DTIF) (Alsaba, 2014)
- Lost circulation in formation with Vugs and natural fractures increase drilling NPT (non-productive time) and Cost (Kumar, 2011)
- Naturally fractured reservoir is unknown on width (Droger, 2014)
INTRODUCTION

- Loss of Millions of dollar due to lost of fluid to formation
- Selection of LCM (Lost Circulation Material) based on the severity of the loss circulation (Savari, 2016)
- Importance of evaluating the LCM prior to the field application (Alsaba, 2014)
- No benchmarking of Graphite performance in wide range of fracture size

(Nayberg and Petty. 1986)
METHOD

- Sample made from Cement
- Certain width of fracture
- 30 cm length

- Pressure measurement
- Water calibrated

- Flow rate and permeability change
- Assuming roughness effect is neglected
OUTLINE

- Procedure
  - Sample preparation
  - Sample measurement

- Water Phase
  - 2 times test
  - Calibration

- Graphite Phase
  - Atmospheric
  - 20 Psi
  - 30 Psi
  - Calibration
Sample Preparation

- Thermally stable
- High compressive strength
- Less than 0.05 ppm heavy metal
- Compatible to any drilling fluid

- 0.07% Xanthan Gum (Xcd) in 1300 ml water
- Stir with 1000 rpm
- Slowly input the Xcd to the water

- % of Graphite to the mixed Xcd-water

- The Xcd would hold the Graphite from settling down
MFP (modified Filter Press)

100 psi Wika

Base Cap:
- Fluid Flow

- Daq and Sensor set

- Sets of Permeability and Rate data
Data

Stable Section (Flow Rate)

Stable Section (Permeability)
Flow rate of 5% Graphite 0.8 mm frac width
Permeability of 5% Graphite 0.8 mm frac width

![Graph showing permeability over time for different conditions](image-url)
FURTHER WORK

- Modification of sample into engineered metal plate to cover wide range of pressure
- Providing better seal in the base cap
- Possible visual examination of Graphite leftover in the fracture-like channel using metal model
- Possibility to introduce roughness for inside wall of fracture

(Kumar, 2011)
REFERENCES


