

UNIVERSITI TEKNOLOGI MARA

**A STUDY ON SILICATE DRILLING
FLUID AND ITS EFFECT ON SHALE
FORMATION**

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ABSTRACT

Silicate-based drilling fluids have been utilized to drill effectively through an extensive variety of troublesome shales in different parts of the world. The silicate based liquid is chosen for its superior clay and shale stabilizing characteristic. . It is also chosen as an alternative to oil based mud and synthetic based mud due to its environmental friendly trait. The process variables that are investigated are the silicate concentration used for drilling fluid formulation and its swelling effect on two different types of shale. The drilling fluids sample is checked for its basic mud properties to check its functionality. The shale is tested using methylene blue for its reactivity. The analysis of the swelling effect of drilling fluids sample towards the shale sample are analyzed using Linear Swell Meter. The results obtained for drilling fluid testing methods of the mud samples are proven to meet the silicate mud system. The MBT test showed that Pierre shale is more reactive than Thailand shale. The swelling effect of drilling fluid samples towards shale sample is measured in percentage. 11% of sodium silicate content gave the lowest swelling rate compared to 0%, 3%, 5% and 7% sodium silicate content in mud sample. In conclusion, silicate based drilling fluids is proven to be used effectively in shale formation.

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

The objective of a drilling operation is to drill, evaluate and complete a well that will produce oil and/or gas efficiently. Drilling fluids (muds) have been employed for usage in drilling of oil and natural gas wells since the early 1900s (Dhiman, 2012). A properly designed drilling fluid will enable an operator to reach the desired geological objective at the lowest overall cost. The drilling fluids serves as the following functions:

- Minimize fluid invasion into formations
- Prevent the flow of oil and gas while drilling
- Control formation pressure
- Minimize shale hydration and dispersion
- Efficiently transport cuttings to surface
- Minimize reservoir damage
- Lubricate and cool the drill bit and drill string
- Transmit hydraulic horsepower to the bit
- Ensure good geological data recovery and formation evaluation
- Control corrosion
- Facilitate cementing and completion
- Minimise HSE risk