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Abstract

This paper investigates the time-dependent effect of drilling fluids on the shear strength properties of Fernie Formation shales. Direct shear tests were conducted on samples that were split along their bedding planes and soaked in four different drilling fluids systems for varying periods of time: oil based mud, gel chem, TAME and PHPA. Distilled water was used as a base line fluid in this study. The shear tests were conducted at a normal stress range of 0 - 1 MPa. For each fluid, five samples were tested, four of which had their natural rough surface, whereas, the surface of one was artificially smoothed. The test results show that both TAME and PHPA fluids increase the angle of shearing resistance of the smoothed shale samples indicating that these may be absorbed into the shales, at least at the surface. The distilled water, oil based and gel chem muds have no effect on the angle of shearing resistance of smooth shale samples, whereas, the angle of shearing resistance of the rough samples decreased. The angle of shearing resistance of the rough samples in the TAME fluid showed both increases and decreases, whereas rough samples in the PHPA fluid had a general increase in the angle of shearing resistance with period of soaking.

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