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DRILLING FLUID FORMULATION

TITLE – Flexible Drilling Fluid Formulation and Application.

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PARTIAL OBJECTIVE – To use **BLACK EARTH** Humalite and other sub-bituminous coal derivatives as an additive used in drilling fluid. The emphasis was on reduction of viscosity and filtration rate.

FORMULATION DESIGN

Formulation	Based Material	Additives to be Investigated
1	Water Bentonite Deffloculant Cellulose Potassium salt/hydroxide Barite	Methyl glucoside / sulfonated asphalt
2	Water Bentonite Xanthan gum Lignosulfonate Lignite Caustic soda Barite	Methyl glucoside / sulfonated asphalt Complex ester
3	Water Sodium chloride Polymer Caustic Polyglycerol Barite	BLACK EARTH Humalite Lignite

RESULTS AND DISCUSSION

Colloidal materials such as clay, starch, and cellulosic derivatives are used to lower filtration of drilling fluid. However they tend to increase viscosity, thus reducing rate of penetration. Additives derived from sub-bituminous coal deflocculates clay and lowers both viscosity and filtration rate. When the drilling fluid contains non-aqueous complex, such as complex ester, the additive will concentrate into emulsion film and results in further reduction in filtration with minimal viscosity increase. Sub-bituminous coal derived additives are also effective for filtration control at high chloride environment. As shown below, **BLACK EARTH** Humalite performed well with respect to viscosity and filtrate.

Formulation	Additive	Plastic viscosity @120 F (cPs)	API Filtrate (mL/30 min)
1	None	26	4.5
	Methyl glucoside/sulfonated asphalt	35	4.0
2	None	20	5.8
	Complex ester	21	5.5
3	BLACK EARTH Humalite	17	4.4
	Lignite	19	6.4