



HOLE 36" TO SET 30" CASING @ 500'

MUD PRODUCTS	CONCENTRATIONS
Bentonite	20 – 30 ppb
Soda Ash	0.50 ppb
Gelex	0.06 – 0.1 ppb

MUD PROPERTIES	RANGE
Mud Weight	8.6 – 9.0 ppb (ALAP)
Funnel Viscosity	60 – 80 secs/qt.
Yield Point	40 – 50 lbs/100 ft ²
PH	9.0 – 9.5

HOLE 26" TO SET 20" LINER @ 5,000'

MUD PRODUCTS	CONCENTRATIONS
Bentonite	20 – 25 ppb
Soda Ash	0.25 – 0.50 ppb
Polypac (R)	0.5 – 1.0 ppb
Xanthum Gum	0.25 – 0.5 ppb

MUD PROPERTIES	RANGE
Mud Weight	8.6 – 9.0 ppb (ALAP)
Funnel Viscosity	60 – 70 secs/qt.
Yield Point	25 – 35 lbs/100 ft ²
Fluid Loss	< 10 ml's
Drill Solids	< 5%
MBT	15 – 20 ppb



HOLE 17 ½" TO SET 13 3/8" LINER @ 10,000'

MUD PRODUCTS	CONCENTRATIONS
Bentonite	15 – 20 ppb
Soda Ash	0.25 ppb
Polypac (R)	0.5 – 1.0 ppb
Polymeric Dispersant	0.025 – 0.05 ppb
Xanthum Gum	0.25 – 0.5 ppb

MUD PROPERTIES	RANGE
Mud Weight	8.6 – 9.0 ppb (ALAP)
Funnel Viscosity	50 – 60 secs/qt.
Yield Point	20 – 30 lbs/100 ft ²
Drill Solids	< 5%
Fluid Loss	5 – 8 ml's
MBT	15 ppb

HOLE 12 ¼" TO SET 9 5/8" LINER @ 17,000'

MUD PRODUCTS	CONCENTRATIONS
Bentonite	12 – 15 ppb
Soda Ash	0.25 ppb
Polypac (R)	1.0 ppb
Polymeric Dispersant	0.025 – 0.05 ppb
Xanthum Gum	0.5 ppb
High Temp Stabilizer	1 – 2 ppb
Modified Lignite/Resin	2 -4 ppb



MUD PROPERTIES	RANGE
Mud Weight	8.6 – 9.0 ppb (ALAP)
Funnel Viscosity	40 – 50 secs/qt.
Yield Point	15– 25 lbs/100 ft2
Drill Solids	< 5%
Fluid Loss	5 – 8 ml's
MBT	12 – 15 ppb

HOLE 8 ½" TO SET 7" LINER @ 20,000'

MUD PRODUCTS	CONCENTRATIONS
Bentonite	10 – 12 ppb
Soda Ash	0.25 ppb
Polypac (R)	1.0 – 2 ppb
Polymeric Dispersant	0.05 – 0.1 ppb
Xanthum Gum	0.5 – 1 ppb
Hi- Temp Poly Stabilizer	2 – 4 ppb
Modified Lignite/Resin	1 – 2 ppb

MUD PROPERTIES	RANGE
Mud Weight	8.6 – 9.0 ppb (ALAP)
Funnel Viscosity	35 – 45 secs/qt.
Yield Point	8– 12 lbs/100 ft2
Drill Solids	< 5%
Fluid Loss	< 5 ml's
MBT	12. – 15 ppb



This high temperature mud formulation is generic as the well temperature profile is not known. The geology, formation reactivity, would also be a factor in specializing the mud chemicals also, therefore actual chemicals and concentrations ranges could vary from those shown.

The 36" and 24" hole intervals require higher viscosities (yield point) for necessary hole cleaning and cuttings removal. An effective mud management system which includes proper solids control should be employed to maintain a temperature stable drilling fluid throughout all intervals

As drilling proceeds past 5,000' (17 ½", 12 ¼", 8 ½" hole) commercial bentonite should be minimized and polymeric viscosifiers utilized. Limit MBT values to a maximum of 15 ppb and total solids to 5% by volume. This will reduce the effect of thermal flocculation.

Thixotropic polymers (PAC, Xanthum gum) provide superior suspension properties, gel structures, and shear thinning; inhibitive; good temp stability. High temperature stabilizers should be used to improve the stability of the drilling fluid as extremely high temperatures are encountered. These stabilizers could include low molecular weight sodium polyacrylate (dispersant) and sulfonated lignite or resins to prevent the clays in the mud from flocculating. A polymeric stabilizer should be used to react with the thixotropic polymers which prevents hydrolysis or thermal degradation prolonging their effectiveness in the drilling fluid.

These are the primary drilling fluid chemicals and fluid property considerations for drilling a high temperature geothermal well.

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