PROPOSED DRILLING FLUID PROGRAM

SURGE ENERGY INC.

SURGE ENERGY HZ PROVOST

106/4-11-39-2 W4

TAPERED MONOBORE - HORIZONTAL

SURFACE LOCATION: 5-12-39-2 W4

TD: 2561m TMD (Sparky Formation)

PREPARED FOR:	Tristar Resource Management Mr. Hugh Rennie Ms. Shellie Scott Mr. Jesse Wasylyshen
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RIG CONTRACTOR:	Star Valley 102
PREPARED ON:	August 5, 2021

ESTIMATED MATERIAL USAGE AND COST

Surge Energy HZ Provost
4-11-39-2 W4
Tapered Monobore-Horizontal

Well Interval	Product Name	Size	Units	Disc Price	Total Estimate
Surface Estimate:					
0 - 106m	Surface Hole has been Preset				
311 mm / 219.1 mm					
Gel Slurry					
	Interval Cost				
Top Hole Estimate:	Calcium Nitrate (Envirofloc)	36.36 kg	4	$44.00	$176.00
106 - 741m MD	Gypsum	25.00 kg	40	$11.00	$440.00
200 mm	Hyperdrill AF 204	25.00 kg	2	$195.00	$390.00
Inhibited Floc Water	Op-T-Con CS-3001	20.00 L	6	$135.00	$810.00
	Interval Cost				$1,816.00
Build Section Estimate:	Bleach	20.00 L	4	$65.00	$260.00
741 - 1166m MD	Caustic Soda	22.68 kg	6	$46.00	$276.00
200 mm	CF Desco II	11.34 kg	6	$100.00	$600.00
Clay Free Polymer	Lignite/Humalite	22.68 kg	12	$12.00	$144.00
	M&D Liquid Lubricant	208.00 L	1	$1,400.00	$1,400.00
	Op-T-Con CS3001	20.00	16	$135.00	$2,160.00
Horizontal Hole Estimate:	PolyXan	25.00 kg	12	$250.00	$3,000.00
1166 - 2561m TMD	Sun Burst DP	22.68 kg	8	$107.00	$856.00
159 mm / 114 mm	UltraPac LV	22.68 kg	34	$167.00	$5,678.00
Clay Free Polymer	UltraPac R	22.68 kg	12	$189.00	$2,268.00
	Walnut	22.68 kg	10	$22.00	$220.00
	Interval Cost				$16,862.00
Engineering Charges:	Field Engineer (as required)	<4 hr	4	$500.00	$2,000.00
	Field Engineer (as required)	>4 hr		$650.00	
	Mileage	$/km	500	$1.00	$500.00
	Interval Cost				$2,500.00
	Total Estimated Mud Cost				**$21,178.00**

POSSIBLE CONTINGENCY MATERIAL

Barite	40.00 kg		$22.00
Caustic Potash	25.00 kg		$110.00
Chembreak ECA	25.00 kg		$240.00
Detergent	20.00 L		$71.00
Drispac SL	22.68 kg		$210.00
Inhibidrill	20.00		$183.00
Millzan (when available)	25.00 kg		$250.00
T-352	20.00 l		$270.00
Soda Ash	22.68 kg		$24.00
Sulphamic Acid	25.00 kg		$135.00

PRICING NOTES

- Any products used but not listed will be supplied off the Surge price list.

- The above estimated mud cost does not include unforeseen problems such as weighting the system up or lost circulation.
- Trucking charges and rentals will be billed directly to Surge Energy unless otherwise directed.

DRILLING FLUIDS PROGRAM

SURFACE SECTION

Interval	**0 – 106m**	
Diameter	**311 mm Hole**	
Mud System	**Preset Casing**	
PROPERTIES	Density	As Low as Possible
	Viscosity (Drilling)	As Required
	(Casing)	55 - 65 s/L
	Plastic Viscosity	Minimum Possible
	Yield Point	As Required
	Gels	As Required
	pH	Neutral
	Fluid Loss	Natural

- ***Surface Hole has been drilled and Preset Casing.***

TOP HOLE / BUILD SECTION

Interval	**106 - 741 m**	
Diameter	**200 mm Hole**	
Mud System	**Inhibited Floc Water – Op-T-Con CS-3001**	
PROPERTIES	Density	1000 - 1010 kg/m³
	Viscosity	28 - 29 s/L
	Calcium	400 - 600 mg/L
	Inhibition	1.0 – 1.5 L/m³

- As necessary, run 1.0 – 1.5 L/m³ of Op-T-Con CS-3001 as previous offsets show upper formations may be susceptible to clays and shale.
- Maintain calcium levels at 400 - 600 mg/L with additions of Calcium Nitrate and Gypsum.
- Flocculate solids with Hyperdrill AF 204, 1 vis cup per 25m of new hole drilled.
- Mud up at 741m MD. Mud up earlier should hole conditions warrant.

- Watch for Mud Rings and/or tight hole while water drilling.

LOWER / BUILD SECTION

Interval	**741 – 1166m TMD**	
Diameter	**200 mm Hole**	
Mud System	**Clay Free Polymer / Op-T-Con CS-3001**	
PROPERTIES	Density	1040 - 1120 kg/m³
	Viscosity - Drilling	45 – 60 s/L
	Inhibition	1.0 - 1.5 L/m³ (If necessary)
	Plastic Viscosity	10 - 20 mPa.s
	Yield Point	3 - 18 Pa
	Gels	2 - 6 / 4 - 12
	pH	8.5- 9.5 (10.5 for H2S in Sparky formation if necessary)
	Fluid Loss	<6 cm³

- Mud up on the fly at ±741 m MD unless hole conditions dictate an earlier mud up. Initial mud up will be done with UltraPac LV/R and Polyxan to maintain drilling fluid properties.

- Control the fluid loss at <6.0 cm³ from the Colony formation to 90° with additions of Lignite and UltraPac LV/R.

- Maintain pH at 8.5- 9.0 with pHix 14 (or Caustic Potash or Caustic Soda). Keep pH in this range to help prevent top hole troubles from excess alkalinity. If required raise pH to 10.5 if H2S is encountered in Sparky.

- If necessary, maintain Op-T-Con CS-3001 concentrations for upper section at 1.0 – 1.5 L/m³ for effective shale mitigation if encountered.

HORIZONTAL SECTION

Interval	**1166 - 2561 m TMD**	
Diameter	**159 mm Hole**	
Mud System	**Clay Free Polymer**	
PROPERTIES	Density	As Low as Possible
	Viscosity - Drilling	45 - 55 s/L
	Plastic Viscosity	10 - 20 mPa.s
	Yield Point	3 - 10 Pa
	Gels	2 - 6 / 4 - 12
	pH	8.5 - 9.0 (10.5 if H2S present)
	Fluid Loss	<5 cm³

- Good solids control equipment will be necessary to maintain mud density as low as possible to avoid differential sticking and excessive solids build up in the mud system. Additions of Op-T-Con CS 3001 (one

pail per 100m in lateral has shown to be effective as keeping solids and density down leading to less dumping.

- Maintain viscosity between 45 - 55 s/L with UltraPac LV/R and Polyxan as required. Keep the horizontal fluids in turbulent flow for maximum hole cleaning while drilling.
- Maintain the pH between 8.5 - 9.0 with Caustic Soda (Caustic Potash) or pHix 14. If required raise pH to 10.5 for H2S.
- Maintain the Fluid Loss at <5 cm^3 with UltraPac LV/R and, Lignite.
- Additions of a lubricant (M&D Liquid Lube) may be used if torque and drag become a problem.
- High viscosity polymer and lubricant sweeps may also be performed to help clean cuttings beds and relieve torque and drag.
- **Do not run Walnut Shells / Sun Burst DP unless approved by wellsite engineer.**

SURFACE HOLE: 0 – 106 m

SURFACE HOLE HAS BEEN DRILLED AND PRESET CASING.

TOP HOLE / BUILD SECTION: 106 – 741 m MD

SOLIDS

Solids and solids control can be a major and costly problem once the well is mudded up. Primary solids removal should be done by mechanical means. Sand traps and skimmers should be fully utilized to give optimum solids control. Secondary solids control will be utilized using water additions to control the drilled fines.

SHALES / SANDS

The upper sections in this area have exhibited bridging problems and or coal stringers. Several drilling parameters may affect this problem, including exposure time, hydraulics and mud system used. We feel the drilling fluid should be designed to give optimum hole cleaning and shale/sand stabilization. To avoid excessive erosion of shales and sands while drilling, annular velocities should be kept within a suitable range.

MUD RINGS

Mud rings are possible while drilling the Joli Fou formation. Control with Spud Sticks and Op-T-Con CS-3001 as required.

PROCEDURE

Inhibited Floc Water (106– 741 m)

PREMIX

The following material should be mixed while waiting on cement:

- 15 sacks Gypsum
- 1/3 sack Hyperdrill AF 204
- 3 pails Op-T-Con CS-3001

FLOCCULANT MIXING

Add 10 - 12 viscosity cups Hyperdrill AF 204 in chemical barrel or per side of the polymer injection tank. Run the flocculant mixture continuously into the bypass trough or the centrifuge suction line while drilling as needed to keep clean water at the suction tank.

MAINTENANCE

Every 4 hours mix approximately 8 sacks of Gypsum to maintain the Calcium Ion concentration between 400 - 600 mg/L.

LOWER BUILD SECTION: 741 – 1166m MD

PROCEDURE

Clay Free Polymer System (741– 1166m MD)

We suggest a Clay Free Polymer system for the main hole section. Mud up with the following system. Initial mud up will be with UltraPac LV/R and Polyxan to maintain drilling fluid properties. Should the connections become tight and hole conditions deteriorate, mud up as required.

STARDRIL	only if required	Fluid Loss Control
CAUSTIC SODA or pHix 14	As required	pH Control
ULTRAPAC LV	2.0 - 2.5 kg/m³	Viscosifier and Primary Fluid Loss Reducer
SODA ASH	2.0 - 3.0 kg/m³	Calcium Remover
POLYXAN	As required	Enhanced Rheology
ULTRAPAC R	2.0 - 2.5 kg/m³	Viscosifier and Secondary Fluid Loss Reducer

SOLIDS

Solids control equipment must function properly as a large volume of solids will be encountered when drilling while mudded up.

DENSITY

1040 - 1120 kg/m³ or the minimum possible that pressures will allow.

VISCOSITY

45 - 60 s/L using UltraPac LV/R and Polyxan with water additions. After changeover, higher viscosities may be required until the hole stabilizes. After the hole has stabilized, lower the viscosity as low as hole conditions allow.

PLASTIC VISCOSITY

Plastic viscosity (10 - 20 mPa.s) should be as low as possible through proper solids control.

YIELD VALUE

Maintain the yield point sufficiently (3 - 18 Pa) to provide stable hole conditions after changeover and for drilling. UltraPac R and Polyxan will be utilized to give sound rheology values at normal annular velocities. Excessive yield value should be avoided as gas or air entrapment and solids retention could become a problem. High values can be controlled by using water additions as required.

GEL STRENGTHS

Gel strengths (Initial: 2 - 6 Pa and after 10 Min: 4 - 12 Pa) must be maintained sufficiently to provide suspension of drilled cuttings. Excessive values should be avoided as gas cutting or air entrapment and solids retention can become a problem.

pH

Maintain pH at 9.5 with pHix 14 or Caustic Soda/Caustic Potash. It is recommended to maintain a pH as low as possible to help prevent hydration of the top-hole shale from the excess alkalinity. If required raise pH to 10.5 if H2S is encountered.

FLUID LOSS

Maintain fluid loss at <6.0 cm³ once into the Colony Formation using Lignite and UltraPac LV as required.

HORIZONTAL HOLE: 1166 - 2561m TMD

PRESSURES

Abnormal pressure should not be a problem in this area. Maintain the mud density as low as hole conditions will allow.

DIFFERENTIAL STICKING

Differential sticking should not be a problem in this area. However proper drilling practices should be observed as there is still a potential for it.

TORQUE AND DRAG

If torque and drag becomes a problem, mix a Lubricant Sun Burst DP and M&D Liquid Lubricant as necessary to reduce friction in the well bore.

PROCEDURE

Clay Free Polymer System (1166 – 2561m TMD)

We suggest a Clay Free Polymer system for the Horizontal section of the well as it will provide sufficient hole cleaning properties and added lubricity.

Proper hydraulics is imperative to minimize sloughing as excessive annular velocities will increase hole erosion. Also, high shear rates on the drilling fluid may reduce the hole cleaning properties of the fluid allowing rubble to accumulate in the well bore. *Annular velocities should be kept at a rate while drilling to avoid excessive erosion but to maintain turbulent flow to maximize hole cleaning.*

SOLIDS

Solids control equipment must function properly as a large volume of solids will be encountered when drilling. The solids content must be maintained at a minimum to help prevent any reservoir damage and excess torque.

DENSITY

'As Low as Possible' or the minimum possible that pressures will allow. Op-T-Con or similar to be added (1 pail per 100 m drilled in later to assist in keeping shales/clay consolidated, allowing for solids control to effectively take out of system. Goal is to minimize amount the dumping of solids laden mud.

VISCOSITY

45 - 55 s/L using UltraPac LV, UltraPac R and Polyxan at 1:1:1 ratio along with water additions. After changeover higher viscosities may be required until the hole stabilizes. After the hole has stabilized, lower the viscosity as low as hole conditions allow. Keep turbulent flow rates on the horizontal section for maximum hole cleaning.

PLASTIC VISCOSITY

Plastic viscosity (10 - 20 mPa.s) should be as low as possible through proper solids control.

YIELD VALUE

Maintain the yield value sufficiently (3 – 10 Pa) to provide stable hole conditions after changeover and for drilling. Polyxan will be utilized to give sound rheology values at normal annular velocities. Excessive yield value should be avoided as gas or air entrapment and solids retention could become a problem.

GEL STRENGTHS

Gel strengths (Initial: 2 - 6 Pa and after 10 Min: 4 - 12 Pa) must be maintained sufficiently to provide suspension of drilled cuttings. Excessive values should be avoided as gas cutting or air entrapment and solids retention can become a problem.

pH

Maintain pH at 9.0 using pHix/14 or Caustic Soda/Caustic Potash. If required raise pH to 10.5 if H2S is encountered.

FLUID LOSS

Maintain at <5 cm^3 using Lignite and UltraPac LV as required.

TORQUE AND DRAG

Additions of a lubricant (M&D Liquid Lubricant) may be used if torque and drag become a problem.

POLYMER BREAK

Additions of Chembreak ECA or similar should be added at TD to assist in breaking down ***polymer.***