Newpark Drilling Fluids, LLC

30-015-34701

DRILLING FLUIDS PROGRAM

PREPARED FOR:

Red Bat Fee # 1

Section 8, T-24-S, R-27-E
Eddy County, New Mexico

SUBMITTED TO:

Mr. Steve Douglas

OGX Resources, LLC
P.O. Box 2064
Midland, Texas 79702

PREPARED BY:

Ron Bailey

Newpark Drilling Fluids, LLC

March 17, 2006

Mr. Steve Douglas
OGX Resources, LLC
P.O. Box 2064
Midland, Texas 79702

Dear Mr. Douglas,

Enclosed are our drilling fluids recommendations for your Red Bat Fee No. 1 well in section 8, T-24-S, R-27-E, Eddy County, New Mexico. They are derived from information from your office, offset well data, and our knowledge of the area.

Estimated mud cost is $ 118,603.34 based on 40 total days with ideal conditions. Severe losses, excessive pressure, stuck pipe or extended days on the well could raise the estimate considerably. Offset wells in this area have experienced abnormal pressures in the 12.5-13.5 pound per gallon range.

Materials	$121,995.08
Discount	-30,498.77
Drayage	20,000.00
Taxes	7,134.04
Total	$118,603.34

For questions or comments call (800) 592-4627 or (432) 697-8661. Both are 24-hour numbers.

Sincerely,

Ron Bailey

Newpark Drilling Fluids, LLC

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Mud Program Summary

Depth	Hole Size	Casing	Mud Wt.	Viscosity	Fluid Loss	pH
0' – 520'	17-1/2"	13-3/8"	8.6-9.0	32-36	N/C	N/C
520' – 2,100'	12-1/4"	9-5/8"	9.9-10.0	28-29	N/C	9-10
2,100' – 9,400'	8-3/4"	7"	8.4-10.0	28-29	N/C	9-10
9,400' – 10,500'	6-1/8"	-	10.0-10.1	28-29	N/C	9-10
10,500' – 12,500'	6-1/8"	4-1/2"	10.1-13.5	38-45	6-10	9-9.5

Potential Problems

17-1/2" Surface Interval 0 – 520'

- Severe seepage and lost circulation.
- Poorly consolidated formations, may require higher than normal viscosity.

12-1/4" Intermediate Interval 520' – 2,100'

- Deviation through the salt.
- Ledges in salt could cause "key-seats".

8-1/2" Interval 2,100' – 9,400'

- Seepage.
- Deviation.
- Abnormal pressure development (Bone Spring and Wolfcamp).

6-1/8" Interval 9,400' – 10,500'

- Seepage.
- Deviation.
- Abnormal pressure development (Lower Wolfcamp).

6-1/8" Interval 10,500'– 12,500'

- Seepage.
- Deviation.
- Abnormal pressure development (Strawn and Atoka).

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Red Bat Fee No. 1
Section 8, T-24-S, R-27-E
Eddy County, New Mexico

17-1/2" Surface Interval

Interval:	0 – 520'
Hole Size:	17-1/2"
Casing Size:	13-3/8"
Total Days:	1
Mud Type:	New Gel/Lime
Properties:	
Weight:	8.6 – 9.0 ppg
Viscosity:	32 – 36 sec/1000cc
Filtrate:	N/C
pH:	N/C

Interval Discussion:

Spud with a conventional New Gel/Lime "spud mud". Use NewGel and native solids to maintain a sufficient viscosity to keep the hole clean. Mix Paper as needed to control seepage loss. Run fresh water at flowline for dilution and volume. Sweep hole with 5-lbs of Super Sweep every 100 feet drilled. Severe losses may require dry drilling to casing point. **Note: See Lost Circulation Procedures*

At total depth of interval, mix in pre-mix pit, 100 barrels of fresh water- NewGel for a viscosity of 100 sec/1000cc, add 0.25 ppb of Super Sweep. Pump this pill prior to trip to run surface casing.

Materials Consumption & Cost:

90	sx	New Gel
10	sx	Lime
5	sx	Paper
2	bx	Super Sweep

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Red Bat Fee No. 1
Section 8, T-24-S, R-27-E
Eddy County, New Mexico

12-1/4" Intermediate Interval

Interval:	520' – 2,100'
Hole Size:	12-1/4"
Casing Size:	9-5/8"
Total Days:	4
Mud Type:	Brine
Properties:	
Weight:	9.9– 10.0 ppg
Viscosity:	28-29 sec/1000cc
Filtrate:	N/C
pH:	9-10

Interval Discussion:

Drill out below Surface Casing with 10.0-ppg brine. Circulate through a controlled portion of the reserve pit for maximum gravitational solids removal. Mix Paper to control seepage losses. Maintain pH control with additions of Caustic Soda. Mix at flow line one gallon of New-55 every 250 feet drilled to promote solids removal. Sweep hole with 50-barrels of system fluid every 500 feet using 5- ppb of Super Sweep. Deviation on this interval can become severe; proper planning of the bottom hole assembly can reduce the deviation.

At total depth sweep the hole using 100-barrels of system fluid - Saltwater Gel for a 60-70 sec/1000cc viscosity and 0.25 pounds per barrel of Super Sweep

Materials Consumption & Cost:

100	sx	Saltwater Gel
25	sx	Paper
15	sx	Caustic Soda
2	cn	New-55
2	bx	Super Sweep

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8-1/2" Hole Interval

Interval: 2,100' – 9,400'
Hole Size: 8-1/2"
Casing Size: 7-5/8"
Total Days: 10
Mud Type: Fresh Water-Brine
Properties:
Weight: 8.4 – 10.0 ppg
Viscosity: 28 – 29 sec/1000cc
Filtrate: N/C
pH: 9 – 10

Interval Discussion:

Drill out from 9-5/8" casing with fresh water. Circulate through the reserve pit for gravitational solids removal. Use sweeps of Paper to control seepage loss. Mix Caustic Soda for pH control. Mix one gallon of New-55 at flowline for every 250 feet drilled to promote solids settling. Sweep hole with 5-lbs of Super Sweep every 500 feet drilled.

Maintain sufficient brine water on location to raise the mud weight in the event of abnormal pressure in the Bone Springs. At total depth fill pre-mix pit with 200 barrels of system fluid. Use Saltwater Gel to increase viscosity of the pre-mix to 80-90 sec/1000cc, add 0.25-ppb of Super Sweep. Sweep the hole with 100-barrels of the pre-mix and spot the remaining 100-barrels on bottom for logging and casing operations.

Materials Consumption & Cost:

100	sx	Saltwater Gel
75	sx	Paper
30	sx	Caustic Soda
5	cn	New-55
5	bx	Super Sweep

6-1/8" Interval

Interval:	9,400' – 10,500'
Hole Size:	6-1/8"
Casing Size:	-
Total Days:	4
Mud Type:	Brine
Properties:	
Weight:	10.0 – 10.1 ppg
Viscosity:	28 – 29 sec/1000cc
Filtrate:	N/C
pH:	9 – 10

Interval Discussion:

Drill out from 7" casing with the 10.0-ppg brine. Circulate through the reserve pit for gravitational solids removal. Use sweeps of Paper to control seepage loss. Mix Caustic Soda for pH control. Mix one gallon of New-55 at flow line for every 250 feet drilled to promote solids settling. Sweep hole with 5-lbs of Super Sweep every 500 feet drilled.

Materials Consumption & Cost:

12	sx	Paper
5	sx	Caustic Soda
1	cn	New-55
1	bx	Super Sweep

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Red Bat Fee No. 1
Section 8, T-24-S, R-27-E
Eddy County, New Mexico

6-1/8" Production Interval

Interval:	10,500' – 12,500'
Hole Size:	6-1/8"
Casing Size:	4-1/2"
Total Days:	21
Mud Type:	Dynazan-New Pac-Starch (white)-Barite
Properties:	
Weight:	10.1 – 13.5 ppg
Viscosity:	38 – 45 sec/1000cc
Filtrate:	10 – 6 cc/30min
pH:	9 – 9.5

Interval Discussion:

Confine circulation to steel pits. Treat the system with Newcide to prevent bacterial degradation of organic materials. Adjust and maintain pH with Caustic Soda. Add Starch (White) to control API filtrate at <10cc. Mix Dynazan to increase the viscosity to 38-40 sec/1000cc. Use S-10 Defoamer to reduce foaming. Small amounts of Desco will modify the rheology. Mix barite to increase fluid density to balance formation pressures encountered.

At 11,800', prior to drilling Morrow, reduce API filtrate to <8cc with White Starch . If abnormal pressures are encountered mix Barite to increase mud weight. Raise viscosity to 40+ sec/1000cc with Dynazan.

Materials Consumption & Cost:

350	tn	Barite (bulk)
20	sx	Soda Ash
150	sx	White Starch
80	sx	Dynazan
40	sx	Caustic Soda
100	sx	Dyna Fiber
25	cn	Newcide
10	sx	Desco
30	cn	S-10 Defoamer

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ENGINEER / WAREHOUSE INFORMATION

WELL NAME: *Red Bat Fee No. 1*

LOCATION: *Section 8, T-24-S, R-27-E*
Eddy County, New Mexico

MUD ENGINEER: *Lynn Pearson* *Carlsbad, New Mexico*
Bill Stewart *Hobbs, New Mexico*

(800) 592-4627 or (432) 697-8661. Both 24 hours.

WAREHOUSE: *Artesia & Lovington, New Mexico*
(800) 592-4627 or (432) 697-8661. Both 24 hours.

Lost Circulation Procedures

Seepage Losses – Mud consumed at the rate of 2.0-2.5 barrels per barrel of hole drilled (18.5± bbls of mud per 100' of 8-3/4" hole drilled) can be expected. The 1.0-1.5 bbls lost per barrel of hole drilled is due to mud retained on cuttings and filtration losses down hole. Volumes in excess of 20 bbls per 100' of hole should be considered seepage losses and the following remedial action taken:

1. Discontinue drilling and circulate cuttings out of the hole at a reduced rate for 5 minutes. Pull one stand and stop pumps to see if the hole is standing full. Keep pipe moving while checking fluid level.

2. If the hole is standing full while static, the seepage losses may be from excessive cuttings, out of gauge hole o circulating pressure losses (ECD). Break circulation slowly and return to drilling, carefully monitoring mud consumption rates and static hole conditions on connections.

3. If the hole is taking fluid while static, prepare a 50-60 bbl pill of 45-50 viscosity mud with 10-20 ppb of Fiber-Plug and 10-20 ppb of Fiber-Seal, and spot near bottom. Pull five stands and check static level of fluid in the hole. Keep hole full at all times and monitor the mud loss rate.

4. If little or no improvement is noted after pumping the 50-60 barrel LCM pill, prepare a balanced, high-filtrate (50cc/30min@100psi) water based pill (40 bbls). This pill can be formulated with Dynazan or New Gel (flocculated with $CaCl2$ or Lime) and Barite. Pull pipe above the suspected loss zone and spot the pill outside the drill pipe at 1 barrel per minute. Pull out of the pill, close the hydril and if a float collar is in the string, pump down the annulus until sufficient backpressure is established. Hold the maximum allowable backpressure (300-900 psi) for 2-4 hours, open the hydril and establish full circulation before going to bottom.

Severe Losses:

1. Should complete returns be lost, stop the pumps and pull the pipe into the casing while pumping through the fill-up line to keep the hole full.

2. Allow the hole to remain static while filling with mud on the annulus side, monitoring the rate of mud loss.

3. Build 50-60 bbl pill of 45-50-viscosity mud with 10-20 ppb of Fiber-Plug and 10-20 ppb of Fiber-Seal, and spot near bottom. Pull five stands and check static level of fluid in the hole. Keep hole full at all times and monitor the mud loss rate. Should the hole stand full, allow 4-6 hours of healing time before staging back to bottom slowly and resuming drilling.

4. Should only partial returns be established, repeat the LCM pill once more. If complete loss of circulation persist, or if only partial returns can be established after the 2^{nd} LCM pill, prepare a balanced, high-filtrate (50cc/30min@100psi) water based pill (40 bbls). Pull pipe above the suspected loss zone and spot the pill outside the drill pipe at 1 barrel per minute. Pull out of the pill, close the hydril and if a float collar is in the string, pump down the annulus until sufficient backpressure is established. Hold the maximum allowable backpressure (300-900 psi) for 2-4 hours, open the hydril and establish full circulation before going to bottom.

5. Should the LCM pills fail to establish returns, be prepared to squeeze cement into loss zone.

Loss of circulation is a possibility on any well. Although each well is different, there are some basic procedures and drilling practices that can aid in reducing the severity and in some, cases prevent lost circulation. Below is a list of several parameters, which may prove helpful.

1. Maintain viscosities as low as possible and still clean the hole.

2. Maintain mud weights as low as possible without jeopardizing safety.

3. Use slower tripping speeds to prevent swabbing and surging.

4. Break circulation in stages while tripping in the hole.

5. Rotate pipe while breaking circulation.

Solids Control

The most important contributing factor to good mud properties is a low native solids content. Conventional means of solids control (dilution, desanders, and desilters), used for water based muds are not economical because these methods can cause loss of liquid portion of the mud and increase chemical consumption. The solids control equipment for this well should include:

- High Speed shale shaker with fine mesh screens.
- Mud Cleaners

Shale Shaker

Use a high-speed shale shaker with fine mesh screens. It is imperative to remove cuttings as quickly as possible before they have a chance to mechanically break up in the circulating system.

Mud Cleaner

Use a mud cleaner using the smallest screen possible (200 mesh). Monitor the discharge to avoid stripping excess amounts of product from the mud.

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Hydraulics

While drilling the deep mature shales in the Permian Basin, it is important to maintain an API filtrate to prevent hydration of the clays contained in those shales. Equally important is to maintain a Laminar Hydraulic Profile in the annulus while drilling those shales. These shale exhibit a high degree of erosion when the annular profile is in turbulent flow.

The annular velocity in the well bore is a measure to control hole cleaning and to determine the annular hydraulic profile. Critical velocity is the point at which flow transitions from laminar to turbulent flow. Mud weight, Plastic Viscosity, Yield Point, Pump Rate, Hole Diameter and tool diameter all are factors in determining critical velocity.

If adjusting the pump rate will affect the bit nozzle optimization, then the rheology can be adjusted to bring the annular profile into laminar flow.

$$\tau C = \frac{1.08\ PV + 1.08\sqrt{PV^2 + 9.26(dh-dp)^2\ YP\ M}}{M\ (dh-dp)}$$

PV = Plastic Viscosity
YP = Yield Point
M = Mud Weight (ppg)
Dh = Diameter of hole (inches)
Dp = Diameter of pipe (inches)

τC = Critical Velocity in feet per second.

Filtration Control & Filter Cake Quality:

Sealing permeable zones in the well bore has long been accepted as a major function of a drilling fluid. The cost of the filtration control represents a major portion of the mud cost. Traditionally, most of this cost has resulted from controlling the filtration rate as opposed to controlling the filter cake quality. This is understandable since a definitive number is more a comfortable target than a subjective evaluation of a filter cake.

The primary objectives of filtration are:

- Minimize damage to the production zones.
- Optimize formation evaluation.
- Avoid differential pressure sticking of the pipe.
- Avoid under gauged holes due to thick filter cakes.

These objectives are achieved by focusing on important design factors:

- Compatibility of filtrate with formation solids.
- Thin, impermeable, and deformable filter cakes.
- Lubricious and shearable filter cakes.

Filtration Control Mechanisms:

There are four basic mechanisms for controlling filtration control and reducing the filter cake permeability. Understanding these mechanisms along with how filtration control products function is important.

1. **Bridging**- Bridging reduces filtration rates and permeability by plugging or blocking the pore spaces at the face of the filter medium. It generally requires solids about one-third the diameter of the pore space to form a bridge. New Gel, Calcium Carbonate, Lost Circulation Materials, Starch, and Soltex (LST-MD) are primary bridging materials.

2. **Bonding**- Bonding is the connecting or binding of solids together. New Pac, Dynazan, WL-100 and other high molecular weight polymers function as bonding materials. Secondarily, these materials function as bridging materials as well as increasing the viscosity of the filtrate.

3. **Deflocculation**- Deflocculants reduce the electro-chemical attraction between solids. This allows solids to be filtered individually, as opposed to flocs, and also reduces the void spaces in the cake created by flocs of solids. Lignite, Chrome Ligno-Sulphonates, Desco, and other low molecular weight polymers perform as deflocculants.

4. **Viscosity**- Fluid loss decreases proportional to the increase in viscosity of the filtrate. Temperature alone will change the filtrate viscosity. Therefore, filtration control is more difficult at high temperatures. Any soluble material added to the fluid

will viscosify the filtrate.

Hydration, Flocculation, and Deflocculation

The degree of hydration and flocculation of the filtered solids influence filter cake permeability. The effectiveness in permeability reduction may be demonstrated by ranking of clay solids according to their surface characteristics:

1. Dehydration/Aggregated/Flocculated (high permeability)
2. Hydrated/Flocculated (medium permeability)
3. Hydrated/Deflocculated (low permeability)

Since fluid loss and filter cake quality are important design factors, it is important to understand the predominate electro-chemical state of the solids. Initially, cake permeability is reduced as pre-hydrated bentonite is added to the system. When flocculated, these hydrated solids promote deformability or permeability reduction with increased pressure. This results from the compaction of hydrated flocs. With deflocculation, permeability is further decreased, as the void spaces created by the flocs diminish.

During drilling operations, hydrated solids are eventually dehydrated as the solids content increases and/or the system is converted to an inhibitive fluid. At this point, a decision must be made on the basis of economic and operational objectives. More pre-hydrated bentonite and/or other products may be added. These other products include New Pac, Calcium Carbonate, CMC, starch, or one of the new generation polymers.

Fluid loss control is a very complex process. The major factors that affect the process include time, pressure, temperature, filtrate viscosity, solids hydration, flocculation and filter cake erodability. Effective evaluation of the process requires that all factors be given strong consideration. Testing the fluids relative to the various factors is necessary to understand how a fluid may perform under down-hole conditions.