District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

DEC 5 2007
OCD-ARTESIA

Form C-101
May 27, 2004

Submit to appropriate District Office

☐ AMENDED REPORT

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
OGX Resources, LLC POB 2064 Midland, TX 79702	217955
	[3] API Number 30 - 015 - 35957

[5] Property Code	[5] Property Name	[6] Well No.
	Rugar State 31	1

[9] Proposed Pool 1	[10] Proposed Pool 2
Salt Draw; Morrow, West	

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
E	31	24S	28E		1980 ~~660~~	N	660	W	Eddy

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
New Well	State		Gas	3058'
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
N	13,000'	Morrow		12-15-2007

Depth to Groundwater N/A	Distance from nearest fresh water well >1000	Distance from nearest surface water >1000

Pit: Liner: Synthetic ☒ 12 mils thick Clay ☐ Pit Volume: 28,500 bbls Drilling Method:

Closed-Loop System ☐ Fresh Water ☒ Brine ☐ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
17 ½"	13 3/8"	54.5	520'	700	0
12 ¼"	9 5/8"	36	2100'	800	0
8 ½"	7"	26	9400'	1050	0
6 1/8"	4 ½"	11.6	13,000'	485	9100'

[22] Describe the proposed program If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zone. Describe the blowout prevention program, if any. Use additional sheets if necessary.

13 3/8" casing, J55, 54.5 ppf, set depth is 520', mud wt.:8.6-8.8, vis. 36-38, pH9 0-10.0, FL-N/C, cement w/ 20 bbl Fresh Water spacer, 1st Lead slurry: 200 sks Premium Plus cmt. + 1% CaCl + 10 lbm/sk Gilsonite + 0.125% Poly-E-Flake. 2nd Lead slurry: 300 sks Light Premium Plus + 0.125 lbm/sk Poly-E-Flake + 1% CaCl. Tail slurry: 200 sks Premium Plus cmt. + 1% CaCl. 9 5/8" casing, J55, 36 ppf, set depth is 2100', mud wt. 10.0-10.1, vis. 29-30, pH 9.0-10.0, FL-N/C, cement w/ 20 bbl Fresh Water spacer, Lead slurry: 600 sks 50/50 Poz Premium Plus cmt. + 10% total Bentonite + 5% Salt + 5 lbm/sk Gilsonite + 0.25% D-AIR 3000. Tail slurry: 200 sks Premium Plus Cmt. + 1% CaCl. 7" casing, P110, 26 ppf, set depth is 9400', mud wt. 8.4-10.0, vis. 28-29, pH 9 0-10.0 FL-N/C, cement w/ 1000 gallons Super Flush 102, Lead slurry: 850 ksk 50/50 Poz Premium cmt. + 10% total Bentonite + 0.3% Halad -9 + 5% Salt + 0.125 lbm/sk Poly-E-Flake. Tail slurry. 200 sks Premium cmt. + 0 5% Halad-9. 4 ½" casing, P110, 11.6 ppf, set depth is 13,000. From 9400' – 11,000' mud wt. 8.4-10.0, vis. 29-30, pH 9-10, FL-<6. At 11,000' mud up to 10.1-13.5, vis. 38-45, pH 9-10, FL-<6. Liner will be ran at 9100' and cemented with 1000 gallons 10# brine water spacer, 485 sks Premum cmt. + 0.5% LAP-1 + 0.4% CFR-3 + 0.25% D-AIR 3000 + 0.2% HR-5.

Operator to set Surface casing above the Salado.

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☒, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature: Angela Lightner

Printed name: Angela Lightner

Title: consultant

E-mail Address: angela@rkford.com

Date: 12-5-2007 Phone: 432-682-0440

OIL CONSERVATION DIVISION

Approved by: BRYAN G. ARRANT

Title: DISTRICT II GEOLOGIST

Approval Date: DEC 07 2007 Expiration Date: DEC 07 2008

Conditions of Approval Attached ☐

DISTRICT I
1625 N. French Dr., Hobbs, NM 88240
DISTRICT II
1301 W. Grand Avenue, Artesia, NM 88210
DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410
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1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, New Mexico 87505

Form C-102
Revised October 12, 2005

Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
	96819	Salt Draw; Morrow West (Gas)

Property Code	Property Name	Well Number
36880	RUGER '31" STATE	1

OGRID No.	Operator Name	Elevation
271995	OGX RESOURCES, L.L.C.	3058'

Surface Location

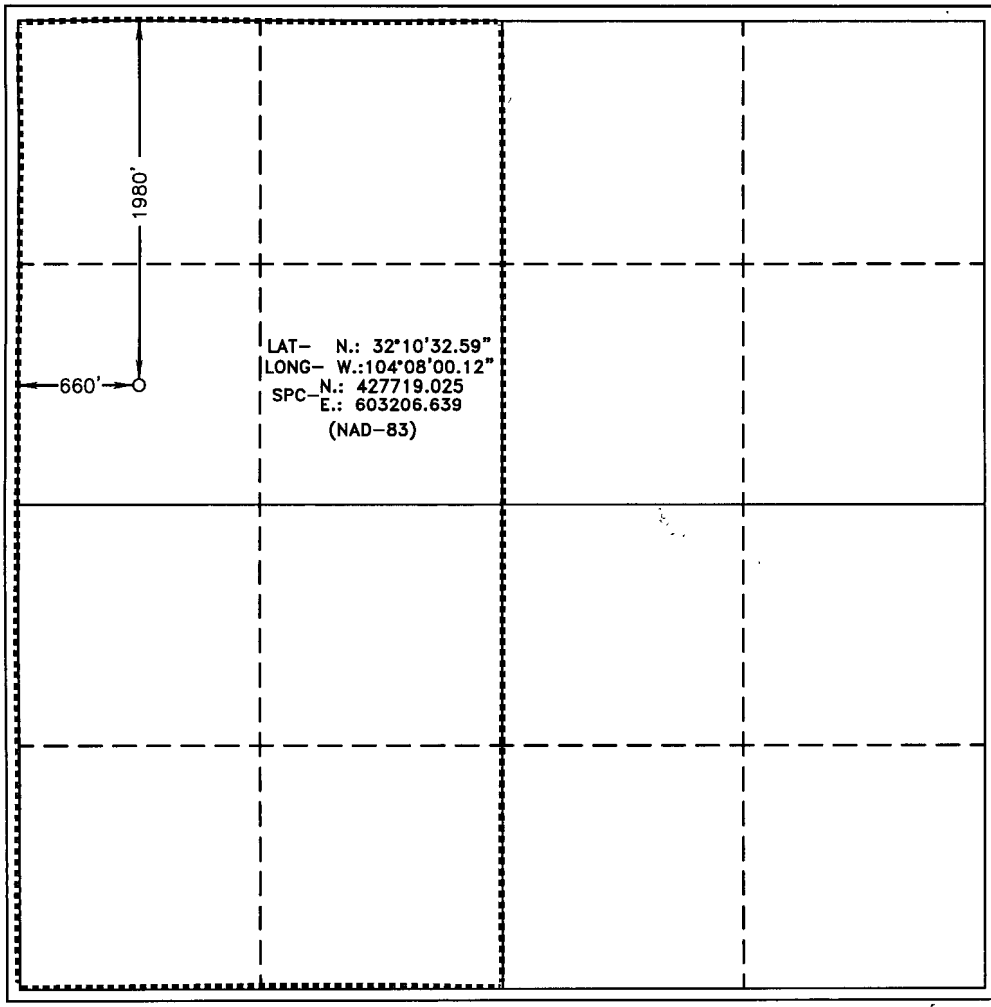
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
E	31	24 S	28 E		1980	NORTH	660	WEST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
320			

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Angela Lightner 12-4-07
Signature Date

Angela Lightner
Printed Name

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervison, and that the same is true and correct to the best of my belief.

NOVEMBER 28, 2007
Date Surveyed

Signature & Seal of Professional Surveyor

GARY L. JONES NEW MEXICO 7977 REGISTERED PROFESSIONAL LAND SURVEYOR

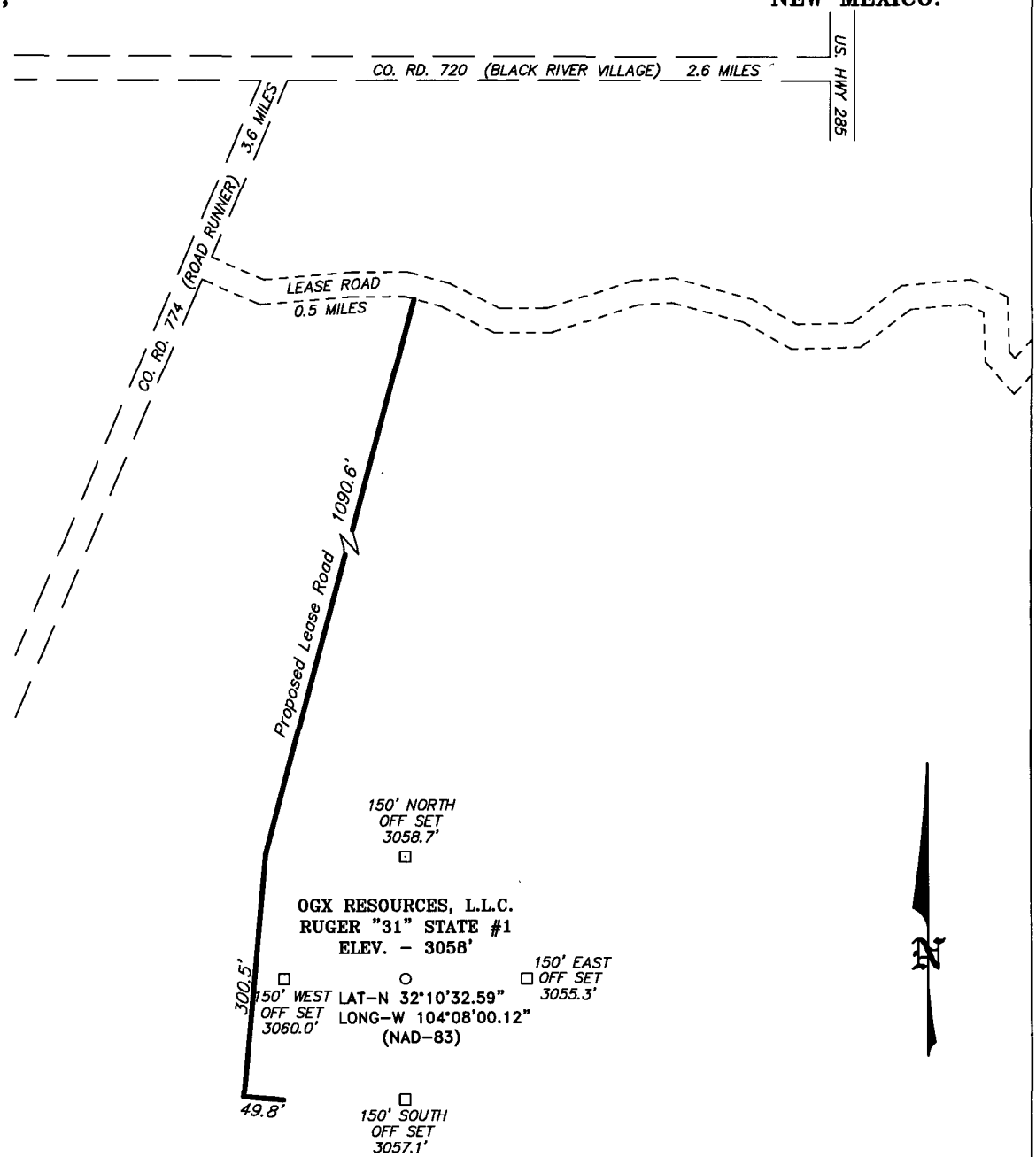
W.O. Number: 23869

Certificate No. Gary L. Jones 7977

BASIN SURVEYS

SECTION 31, TOWNSHIP 24 SOUTH, RANGE 28 EAST, N.M.P.M.,

EDDY COUNTY, **NEW MEXICO.**



DIRECTIONS TO LOCATION:

FROM THE JUNCTION OF STATE HWY 285 AND CO. RD. 720 (BLACK RIVER VILLAGE) PROCEED WEST 2.8 MILES TO CO. RD. 774 (ROAD RUNNER), ON ROAD RUNNER PROCEED SOUTHWEST 3.4 MILES TO LEASE ROAD, ON LEASE ROAD PROCEED 1.2 MILES EAST TO PROPOSED LEASE ROAD.

BASIN SURVEYS P.O. BOX 1786 – HOBBS, NEW MEXICO

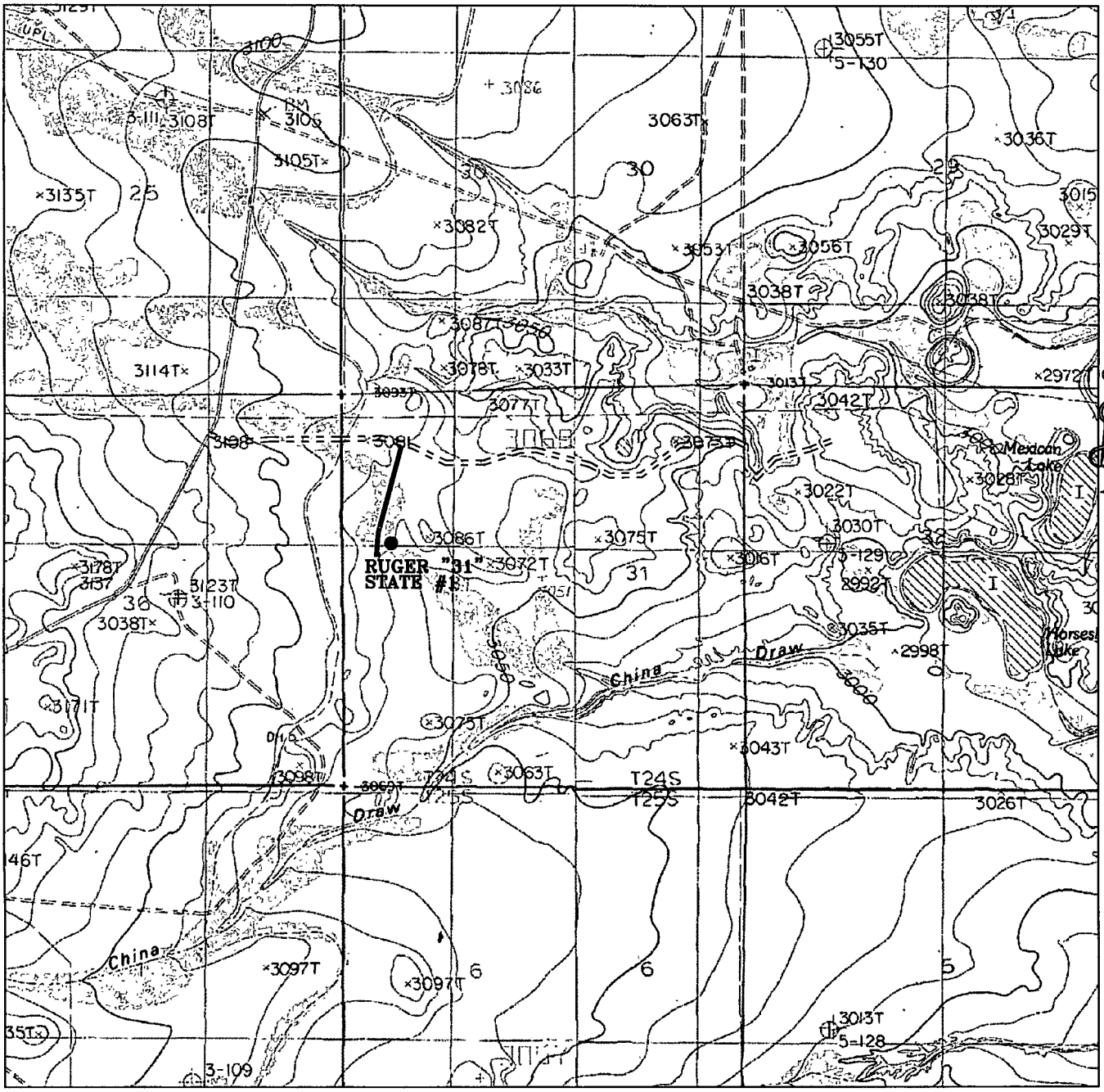
W.O. Number: 18869	Drawn By: K. GOAD
Date: 12-03-2007	Disk: KJG – 18869W.DWG

OGX RESOURCES, L.L.C.

REF: RUGER "31" STATE #1 / Well Pad Topo

THE RUGER "31" STATE #1 LOCATED 1980' FROM THE NORTH LINE AND 660' FROM THE WEST LINE OF SECTION 31, TOWNSHIP 24 SOUTH, RANGE 28 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO.

Survey Date: 11-28-2007	Sheet 1 of 1 Sheets



RUGER "31" STATE #1

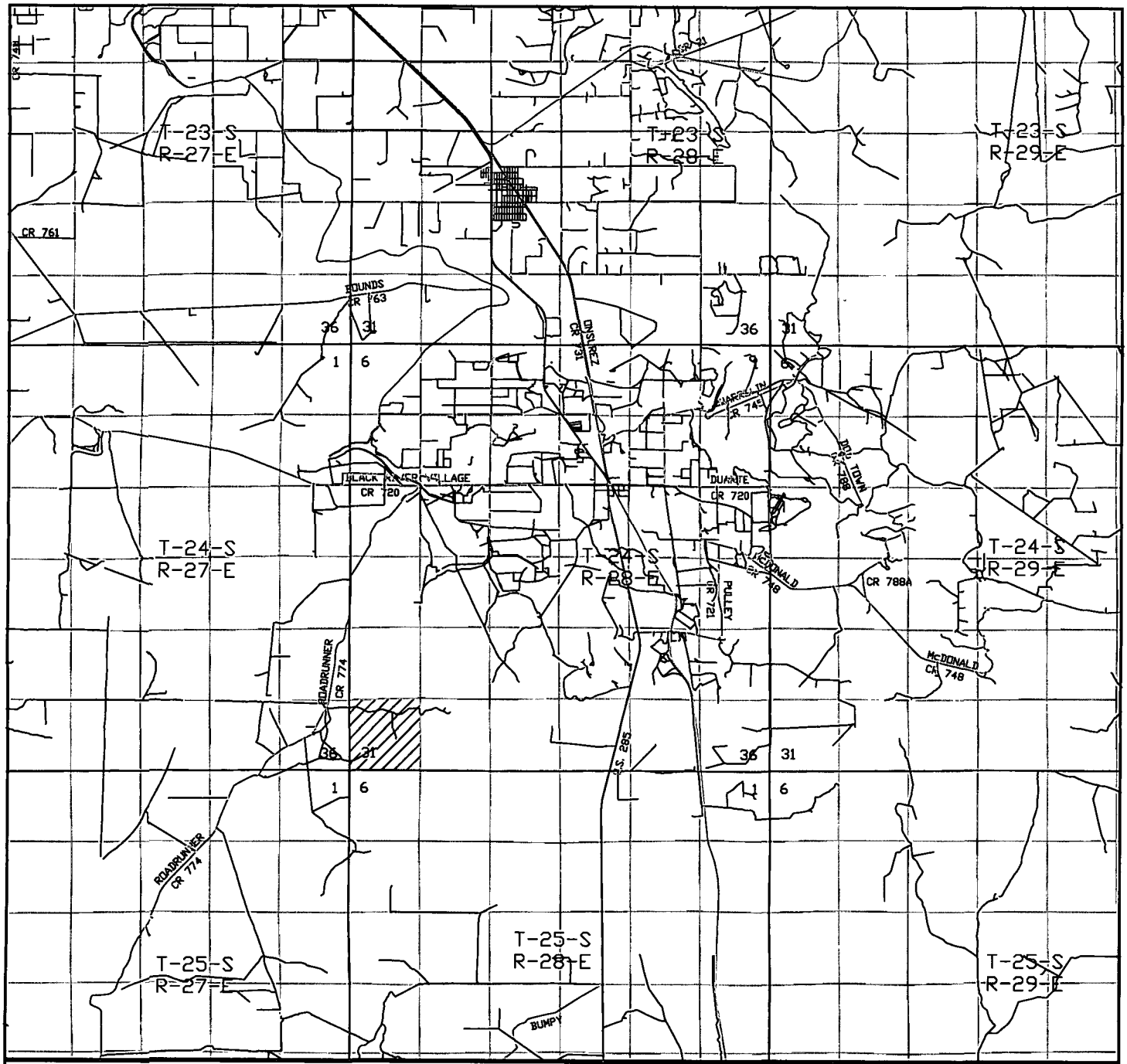
1980' FNL & 660' FWL
Section 31, Township 24 South, Range 28 East,
N.M.P.M., Eddy County, New Mexico.

basin surveys
focused on excellence in the oilfield

P.O. Box 1786
1120 N. West County Rd.
Hobbs, New Mexico 88241
(505) 393-7316 - Office
(505) 392-3074 - Fax
basinsurveys.com

W.O. Number:	18869T
Survey Date:	11-28-2007
Scale:	1" = 2000'
Date:	12-03-2007

OGX RESOURCES L.L.C.



RUGER "31" STATE #1
1980' FNL & 660' FWL
Section 31, Township 24 South, Range 28 East,
N.M.P.M., Eddy County, New Mexico.

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(505) 393-7316 - Office
(505) 392-3074 - Fax
basinsurveys.com

W.O. Number:	18869T
Survey Date:	11-28-2007
Scale:	1" = 2 MILES
Date:	12-03-2007

OGX
RESOURCES
L.L.C.

OGX Resources
Well Prognosis
Rugar State 31 #1

API # 30-015-

Surface Location:	1980' FNL & 660' FWL Sec. 31, T24S, R28E Eddy County, New Mexico
Proposed Bottom Hole Location:	Same as Surface
Planned AFE Total Depth:	13,000 TVD / 13,000' MD
Contractor: Rig:	Permian Drilling Rig 3
Prepared By:	Randell Ford, R. K. Ford & Associates

Proposed Drilling and Completion Summary

The Rugar State 34 #1 well is planned as a 13,000' TVD / 13,000' MD. The Morrow is the primary objective.

This project is located approximately 6 miles Southwest of Malaga, Eddy County, New Mexico. Casing includes 20" structural/conductor, 13 3/8" surface, 9 5/8" intermediate, 7" intermediate, and 4 1/2" production liner. The well is planned to be drilled as a vertical well to TD. Formation evaluation will be performed using open-hole logging tools. A well completion procedure will be prepared by engineering after the well is evaluated. Production tubing will be 2 3/8" to handle anticipated production rates.

DIRECTIONS

From the junction of State Hwy. 285 and Co. Rd. 720 (Black River Village Road) proceed West 2.8 miles to Co. Rd. 774 (Road Runner). On Road Runner proceed Southwest 3.4 miles to lease road. On lease road proceed 1.2 miles East to location.

ESTIMATED RIG ELEVATION: 3,081' K.B. 3058' G.L.
(rig K.B. 23')

ESTIMATED FORMATION TOPS: (These Tops Are Only ESTIMATED)

Formation	TVD	Subsea
Lamar LM (Casing Point)	2,100'	
Delaware	2,510'	
Cherry Canyon	3,460'	
Brushy Canyon	4,775'	
Lower Brushy Canyon	5,780'	
Bone Spring	6,065'	
1st Bone Spring Sd	7,040'	
2nd Bone Spring Sd	7,730'	
3rd Bone Spring Sd	8,975'	
Wolfcamp	9,320'	
Casing Point (Intermediate 7")	9,400'	
Middle Wolfcamp	10,560'	
Strawn	11,565'	
Atoka	11,760'	
Morrow	12,250'	
Middle Morrow	12,575'	
TD	13,000' ±	

CASING PROGRAM:

SIZE	WEIGHT	GRADE	COUPLING	(MD-RKB)	TORQUE
20"	Structural Pipe	LP		0-40'	
13 3/8"	54.5 ppf	J-55	ST&C	0-520'	
9 5/8"	36.0 ppf	J-55	LT&C	0-2,100'	
7"	26.0 ppf	P-110	LT&C	0-9,400'	
4 1/2"	11.6 ppf	P-110	LT&C	9,400 – 13,000'	

LOGGING PROGRAM:

8 ½' Hole, 2,100' – 9,400', Gamma Ray, Dual Lateralog, Micro Lateralog, Photo Density, Comp/Neutron only back to surface.
6 1/8" Hole, Gamma Ray, Dual Laterolog, Micro Laterolog, Photo Density, Comp/Neutron logged from TD – casing at 9,400' (Tie-in to previous run). Possible HMI-Imager.

MUD PROGRAM:

DEPTH	MW	Viscosity	FL	Synopsis
0'- 520'	8.6-8.8	36-38 vis	NC	Spud mud, paper.
520'- 2,100'	10.0-10.1	29-30 vis	NC	Brine, gel sweeps
2,100' - 9,400'	8.4-10.0	28-29 vis	NC	Fresh, gel sweeps
9,400'-13,000'	8.4-13.5	29-45 vis	NC	Fresh, Brine, Dynazan

See attached mud program for additional specifications.

MUD LOGGING:

Mud logging unit is rigged up and logging at 1900'. Collect 10' samples from 2,600' to TD. **Note: Mud logger to pick 9 5/8" & 7" casing points.**

DRILLSTEM TESTS/ CORES:

None planned

DRILLING PROCEDURE

I. LOCATION PRE-SPUD

1. Set 40' of 20" conductor prior to rig up.

2. Review State Permit, offset well data, procedure, formation depths and BOP/casing testing requirements. Hold pre-spud meeting with vendors and operator. Rig up Permian Rig 3, prepare to spud well. Visually inspect rig's 13 5/8" 5M BOP's (replace and repair as required). Record and report fuel on location at spud.

II. SURFACE HOLE INTERVAL 40'- 520'

1. Spud with a 17-1/2" rental mill tooth bit and BHA with sufficient 8" drill collars to supply necessary bit weights. Stabilizers as needed to ensure a straight hole. (Record time and date of spud on morning report.) Pump gel sweeps as needed and before and after any trips. Survey as required to monitor deviation.

2. Surface hole to be drilled with a fresh water gel/lime spud mud with following properties: MW 8.6-8.8, VISC 36-38, API-FL N/C. Pump a high visc sweep prior to running casing. Strap DP and DCs out of hole.

3. Rig up casing tools and run casing as follows:

    13-3/8" Texas Pattern Guide Shoe
    1 Joint 13-3/8", 48.0 ppf, J-55, STC Casing
    13-3/8" Float Collar
    +/- 500' 13-3/8", 48.0 ppf, J-55, STC Casing

4. Centralize with (6) centralizers placed as follows: middle of shoe jt., top of 2nd jt., top of 4th jt., then every third jt. Thread lock all float equipment (top & bottom).

5. Pump capacity of casing prior to commencing any cementing operations. Tag and land casing on bottom. Hold running weight tension while WOC. Cement per prognosis (volumes based on 100% excess of calculated volume for gauge hole). WOC total of 2 - 4 hours or until tail slurry has attained 500 psi compressive strength (use location water sample to get lab results).

6. Cut off 13-3/8" to weld on 13-3/8" SOW casinghead x 13 5/8" 3M wellhead and test to 70% of collapse. Ensure wellhead height matches production requirements and BOPs heights.

III. INTERMEDIATE HOLE SECTION INTERVAL 520' – 2,100'

1. Nipple up 13-5/8" 5M BOP equipment. Test BOP and choke manifold to 500 psi. Check gauge on choke panel for accurate pressures, replace it if required. RIH with 12 1/4" insert bit and BHA with sufficient 8" drill collars to supply necessary bit weights. Stabilizers as needed to ensure a straight hole. Test 13-3/8" casing to 500 psi.

2. Drill float collar, cement, and float shoe. If first 20' of float shoe joint drills with wet cement, WOC prior to drilling remainder of joint and notify office.

3. Drill and survey a straight hole. Survey every 300' or more often as required to monitor deviation. Circulation rates as needed to ensure good hole cleaning.

4. This interval to be drilled with brine water having the following properties: MW 10.0-10.1, VISC 29-30, API-FL N/C, circulating the inside reserve pit. If lost circulation is encountered, refer to procedures in mud program.

5. When ± 2,100', casing point is reached, circulate and condition hole in preparation to run casing. Sweep the hole with 150 bbl 50 visc fresh gel sweep prior to running casing.

6. Rig up casing tools and run casing as follows:

    9-5/8" Float Shoe
    (1) Joint 9-5/8", 36.0 ppf, J-55, LT&C Casing
    9-5/8" Float Collar
    +/- 2,460', 9-5/8", 36.0 ppf, J-55, LT&C Casing

7. Centralize with (5) centralizers placed as follows: middle of shoe jt., top of 2nd jt., top of 4th jt., then every fourth jt. Thread lock all float equipment (top & bottom).

8. Cement per cement prognosis. Pump capacity of casing prior to commencing any cementing operations. Tag and land casing on bottom, hold running weight tension while WOC. Cement per prognosis (volumes based on fluid caliper results). WOC total of 24 hours or until tail slurry has attained 500 psi compressive strength (use location water sample to get lab results).

9. Cut off 9-5/8" and set in 13-3/8" casinghead bowl. Nipple up 13 5/8" 3M x 11" 5M casing spool (Test casing to 70% of collapse) and BOP equipment. Test BOP and choke manifold to 5,000 psi or full working pressure. Check gauge on choke panel for accurate pressures, replace it if required. Ensure wellhead height matches production requirements and BOPs heights. Install dual super chokes, PVT and flow sensors, mud-gas separator and bar bins.

IV. INTERMEDIATE HOLE SECTION INTERVAL 2,100' – 9,400' TD

1. RIH with 8 1/2" insert button bit and BHA with sufficient 6 1/2" drill collars to supply necessary bit weights. Stabilizers as needed to ensure a straight hole. Test 9-5/8" casing to 1500 psi.

2. Drill float collar, cement, and float shoe. If first 20' of float shoe joint drills with wet cement, WOC prior to drilling remainder of joint and notify office.

3. Drill and survey a straight hole to ± 9,400 T.D. Survey every 500' or more often as required to monitor deviation. Circulation rates as needed to ensure good hole cleaning.

4. Drill out casing with fresh water, circulating through the outside reserve pit. Pump sweeps as needed to ensure good hole cleaning. If lost circulation is encountered, refer to procedures in mud program.

5. At total depth circulate and condition hole, short trip, circulate and condition, POH (strapping DP and DCs). Rig up loggers and run wireline logs as proposed or as dictated by the office.

6. Trip in hole. Circulate and condition hole in preparation to run casing.

7. Trip out of hole. Lay down DP and DC's.

8. Rig up casing tools and run 7" casing as follows:

   7" Float Shoe
   (1) Joint 7" 26.0 ppf, P-110, LT&C
   7" Float,
   ±9,150', 7" 26.0 ppf, P-110, LT&C

9. Pump capacity of casing prior to commencing any cementing operations.

PDC Drillable Float Equipment & Plug Required on 7" Casing.

V. FINAL HOLE SECTION INTERVAL 9,400' – 13,000' TD

1. RIH with 6-1/8" PDC bit and BHA with sufficient drill collars to supply necessary bit weights. Test 7" casing to 2,000 psi.

2. Drill float collar, cement, and float shoe. If first 20' of float shoe joint drills with wet cement, WOC prior to drilling remainder of joint and notify office.

3. Drill and survey a straight hole to ±13,000' T.D. Survey every 500' or more often as required to monitor deviation. Circulation rates as needed to ensure good hole cleaning. Record slow pump rates everyday and every time mud proportion changes.

4. Drill out casing with fresh water or existing mud, circulating through the working pits. Pump sweeps as needed to ensure good hole cleaning. If lost circulation is encountered, refer to procedures in mud program. Mud up at 12,200' with Calcium Carbonate and Dynazan to increase viscosity.

5. At total depth, circulate and condition mud and hole, short trip, circulate and condition, POH (strapping DP and DCs). Rig up loggers and run wire line logs as proposed or as dictated by the office.

6. Trip in hole. Circulate and condition mud and hole in preparation to run production liner.

7. Trip out of hole with drill pipe. Prepare to run liner.

8. Rig up casing tools and run 4 1/2" liner as follows:

    4 1/2" Dual Valve Float Shoe
    (1) Joint 4 1/2" 11.6 ppf, P-110, LT&C
    4 1/2" Landing Collar
    ±3,400' 4 1/2" 11.6 ppf, P-110, LT&C
    7" x 4 1/2" liner hanger assembly
    8,000# liner top packer & tieback

9. Check and record liner weight before tripping in the hole. Trip in hole with liner under full hydromatic. Fill drill string every 10 stands while tripping in the hole with liner. Pick up manifold and wash liner to bottom. Circulate liner for 15 minutes. Hang liner off. Rotate out of liner. Pickup drill string and check weight to make sure liner is hung off. Pump capacity of liner and drill string prior to commencing any cementing operations.

10. Cement per cement prognosis. Displace liner with fresh water and drill string with drilling mud. Do not over displace. Pickup drill string approx. 12', set back down and set liner top packer with 30,000# or more. Pull 10 stands of drill pipe. Pickup Kelly. Circulate annulus 150% and rotate drill string while circulating. TOOH with liner stinger and lay down.

11. TIH with 6-1/8" bit and drilling assembly to 6,000' and circulate. Drill cement off liner top after total cement time of 18 hours. Circulate hole clean. Test liner top or displace hole with fresh water or KCL water.

12. Lay down drill string. Nipple down BOP's. Nipple up wellhead. Clean pits. Release drilling rig and all rental equipment. Record and report fuel on location at rig release.

13. Refer to completion procedure.

Newpark Drilling Fluids, LLC

DRILLING FLUIDS PROGRAM

PREPARED FOR:

Rugar State 31 #1

Section 31, T-24-S, R-28-E
Eddy County, New Mexico

SUBMITTED TO:

Mr. Kip Agar

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

PREPARED BY:

Mike Davis

Newpark Drilling Fluids, LLC

November 15, 2007

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

Dear Mr. Agar,

Enclosed are our drilling fluids recommendations for your Rugar State 31 #1 well in section 31, T-24-S, R-28-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 $ 240,000.00 to $250,000.00 based on 38 to 42 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.

***Calcium Carbonate will be used as the weighting agent in all pipe slugs, and mud weight increases. ABOSULTLEY NO BARITE WILL BE USED. If weights are needed above 12.0 ppg, Barite will only be used after a thorough discussion with the operator.**

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

Sincerely,

Mike Davis

Newpark Drilling Fluids, LLC

OGX Resources, LLC
Rugar State 31 #1
Section 31, T-24-S, R-28-E
Eddy County, New Mexico

PROGRAM HIGHLIGHTS:

TOTAL DEPTH	:	**12,800'**
CASING REQUIREMENTS	:	**Interval 1: 17-1/2" hole to 520', set 13-3/8" casing.**
	:	**Interval 2: 12-1/4" hole to 2,100', set 9-5/8" casing.**
	:	**Interval 3: 8-3/4" hole to 9,400', set 7" casing.**
	:	**Interval 3: 6-1/8" hole to 12,800', set 4-1/2" liner.**
MUD WEIGHT REQUIREMENTS	:	**8.6 – 8.8 ppg @ 520'**
	:	**8.4 – 10.0 ppg @ 2,100'**
	:	**8.4 – 10.0 ppg @ 9,400'**
	:	**11.0 – 13.5 ppg @ 12,800'**
DAYS TO REACH TD	:	**38 – 42**
COST ESTIMATE	:	**$240,000.00 to $250,000.00**
WAREHOUSE	:	**Midland, Texas** (800) 592-4627
		David Volz, Distribution Manager
PERMIAN BASIN PERSONNEL	:	**Midland, Texas** (800) 592-4627
	:	**Joe Henderson**, Permian Basin Business Unit Manager
	:	**Al Boudreaux**, Sales Manager
	:	**Doug Thomas**, Sales
	:	**Ken Anthony**, Engineering Manager
	:	**Mike Davis**, Technical Manager

MUD PROPERTIES SUMMARY:

Depth (feet)	Weight (ppg)	Viscosity (sec/1000cc)	Fluid Loss (cc/30min)	PV (cps)	YP (lb/100ft^2)	Mud Type
0' – 520' Set 13-3/8" Casing	8.6 – 8.8	36 – 38	N/C	6 – 10	6 – 20	**Spud Mud**
530' – 2,100' Set 9-5/8" Casing	10.0 – 10.1	29 – 30	N/C	0 – 1	0 – 1	**Brine**
2,100' – 9,400' Set 7" Liner	8.4 – 10.0	28 – 29	N/C	0 – 1	0 – 1	**Fresh Water to Brine**
9,400' – 11,000' -	8.4 – 10.0	28 – 29	N/C	0 – 1	0 – 1	**Fresh Water to Brine**
11,000' – 12,800' Set 4-1/2"	11.0 – 13.5	38 – 40	10 – 6	6 – 28	14 – 24	**Dynazan / Starch *Calcium Carbonate**

Note: The mud weight schedule is intended as a guideline only. Actual mud weights used should be determined by hole conditions and drilling parameters.

***Calcium Carbonate will be used as the weighting agent in all pipe slugs, and mud weight increases.**

ABOSULTLEY NO BARITE WILL BE USED. If weights are needed above 12.0 ppg, Barite will only be used after a thorough discussion with the operator.

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PROGRAM HIGHLIGHTS (CONT'D):

HOLE & CASING DESIGN:

INTERVAL	DEPTH (feet)	BIT SIZE	CASING (OD)	ANTICIPATED MUD WT. (ppg)
INTERVAL 1	520'	17-1/2"	13-3/8"	8.6 – 8.8
INTERVAL 2	2,100'	12-1/4"	9-5/8"	8.4 – 10.1
INTERVAL 3	9,400'	8-3/4"	7"	8.4 – 10.1
INTERVAL 4	12,800'	6-1/8"	4-1/2"	8.4 – 13.5

SOLIDS CONTROL:

INTERVAL	RECOMMENDED SOLIDS CONTROL EQUIPMENT
INTERVAL 1	Two linear motion shale shakers and one desander.
INTERVAL 2	Reserve.
INTERVAL 3	Reserve.
INTERVAL 4	Reserve.
INTERVAL 5	Two linear motion shale shakers and centrifuges.

ESTIMATED FORMATION TOPS:

FORMATION	DEPTH
Lamar LM	2,460'
Delaware Sand	2,510'
Cherry Canyon	3,460'
Brushy Canyon	4,775'
Lower Brushy Canyon	5,780'
Bone Spring	6,065'
1st Bone Spring Sand	7,040'
2nd Bone Spring Sand	7,730'
3rd Bone Spring Sand	8,975'
Wolfcamp	9,320'
Middle Wolfcamp	10,560'
Strawn	11,565'
Atoka	11,760'
Morrow	12,250'
Middle Morrow	12,575'
Total Depth	**12,800'**

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Interval 1: **17-1/2" Hole**
Interval: **0' – 520'**
Casing: **13-3/8**
Days: **2**

Drilling Fluid Properties:

Depth (feet)	Weight (ppg)	Viscosity (sec/1000cc)	PV (cps)	YP (lb/100ft²)	pH (value)	Fluid Loss (cc/30min)	LG Solids (%)
0' – 520'	8.6 – 8.8	36 – 38	6-10	6-20	9.0-10.0	No Control	<6

Drilling Fluid Recommendations:

A non-dispersed **NewGel** system is recommended for this interval, with pre-hydrated **NewGel** and **Soda Ash** as the primary system components for rheological control. Utilize **Paper** sweeps to aid in seepage control. If losses occur batch treat with 12-15 ppb **Fiber Seal** in a 50 bbl premix with 36-38 sec/1000cc viscosity.

At total depth, sweep the hole with 100-barrels of fresh water and **New Gel** for a 80-90 sec/1000cc viscosity and 0.25-ppb **Super Sweep**. Circulate hole clean prior to running casing.

Materials Consumption

175	sx	New Gel
10	sx	Soda Ash
10	sx	Paper
1	bx	Super Sweep

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Maintenance Procedure: Interval 1

Fluid Loss - Fluid loss control is unnecessary through this interval.

Mud Weight - Run water and premixes as needed to maintain volume and weight as specified.

Rheology - Solids content is the primary factor that will affect rheology. Maintain viscosity as needed for this interval.

Alkalinity - Maintain pH in the 9.0-10.0 range with **Soda Ash**.

Solids Control - Maintain low gravity solids at <6% by volume. The shakers should be equipped with the finest mesh screens that will handle the circulating volume.

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Interval 2: **12-1/4" Hole**
Interval: **520' – 2,100'**
Casing: **9-5/8"**
Days: **5**

Drilling Fluid Properties:

Depth (feet)	Weight (ppg)	Viscosity (sec/1000cc)	PV (cps)	YP ($lb/100ft^2$)	pH (value)	Fluid Loss (cc/30min)	LG Solids (%)
520' – 2,100'	10.0 – 10.1	29 – 30	0-1	0-1	9.0-10.0	No Control	<6

Drilling Fluid Recommendations:

Drill out from the 13-3/8" casing with brine water circulating a controlled portion of the reserve pit for gravitational solids control. Utilize **Paper** sweeps to aid in seepage control. The pH should be maintained at 9.0-10.0 with additions of **Caustic Soda**. Utilize **New-55** sweeps (2-3 quarts per connection) to aid in cuttings removal. Sweep the hole with 100 barrels of fresh water and **New Gel** for a 80-90 sec/1000cc viscosity and 0.25-lbs of **Super Sweep** every 500 feet drilled to aid in cuttings removal. If losses occur batch treat with 12-15 ppb **Fiber Seal** in a 50 bbl premix with 36-40 sec/1000cc viscosity.

At total depth, sweep the hole with 100-barrels of fresh water and **New Gel** for a 80-90 sec/1000cc viscosity and 0.25-ppb **Super Sweep**. Circulate hole clean prior to running casing.

Materials Consumption

150	sx	New Gel
30	sx	Paper
20	sx	Caustic Soda
4	pl	New-55
2	bx	Super Sweep

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Maintenance Procedure: Interval 2

Fluid Loss - Fluid loss control is unnecessary through this interval.

Mud Weight - Maintain minimum fluid densities.

Alkalinity - Maintain pH in the 9.0-10.0 range with **Caustic**.

Mud Losses Down hole - Loss of circulation is a possibility through this interval. Use **Fiber Plug** and **Fiber Seal**. Keep the hole full at all times and avoid excessive swabbing and/or surge actions when tripping pipe. Bring pumps on the hole gradually anytime circulation has been interrupted, increasing pump strokes only after full returns are established.

Solids Control - Maintain low gravity solids at <6% by volume. Circulating the reserve will provide gravitational solids control.

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Interval 3: **8-3/4" Hole**
Interval: **2,100' – 9,400'**
Casing: **7"**
Days: **16**

Drilling Fluid Properties:

Depth (feet)	Weight (ppg)	Viscosity (sec/1000cc)	PV (cps)	YP (lb/100ft^2)	pH (value)	Fluid Loss (cc/30min)	LG Solids (%)
2,100' – 9,400'	8.4 – 10.0	28 – 29	0 –1	0 – 1	9.0-10.0	N/C	<6

Drilling Fluid Recommendations:

Drill out from the 9-5/8" casing with Fresh water circulating the remaining portion of the reserve. The pH should be maintained at 9.0-10.0 with additions of **Caustic Soda**. Sweep the hole with 100 barrels of fresh water and **New Gel** for a 80-90 sec/1000cc viscosity and 0.25-lbs of **Super Sweep** every 500 feet drilled to aid in cuttings removal. If losses occur batch treat with 12-15 ppb **Fiber Seal** in a 50 bbl premix with 36-40 sec/1000cc viscosity.

Maintain sufficient brine on location to raise the mud weight in the event of abnormal pressure in the Bone Springs. At total depth fill premix pit with 100 barrels of fresh water and **New Gel** for a 80-90 sec/1000cc viscosity and 0.25-lbs of **Super Sweep.** Sweep prior to casing operations.

***Calcium Carbonate will be used as the weighting agent in all pipe slugs, and mud weight increases. ABOSULTLEY NO BARITE WILL BE USED. If weights are needed above 12.0 ppg, Barite will only be used after a thorough discussion with the operator.**

Materials Consumption

200	sx	New Gel
60	sx	Paper
40	sx	Caustic Soda
2	bx	Super Sweep

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Maintenance Procedure: Interval 3

Fluid Loss - Fluid loss control is unnecessary through this interval.

Mud Weight - Run water and premixes as needed to maintain volume and weight as specified. Drilling with a minimum amount of overbalance will reduce the possibility of losing returns and/or of differentially sticking the drill string.

Alkalinity - Maintain pH in the 9.0-10.0 range with **Caustic**.

Hole Cleaning - Optimum hydraulics and rheological properties should be maintained to provide maximum hole cleaning and minimize washout of the well bore. Sweep the hole with fresh water mud pills made of **New Gel** for a 80-90 sec/1000cc viscosity and 0.25 ppb of **Super Sweep** every 500'.

Mud Losses Down hole - Loss of circulation is a possibility through this interval. Use **Fiber Plug** and **Fiber Seal**. Keep the hole full at all times, and avoid excessive swabbing and/or surge actions when tripping pipe. Bring pumps on the hole gradually anytime circulation has been interrupted, increasing pump strokes only after full returns are established.

Solids Control - Maintain low gravity solids at <6% by volume. Circulating the reserve will provide gravitational solids control.

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Interval 4: **6-1/8" Hole**
Interval: **9,400' – 11,000'**
Casing: **-**
Days: **5**

Drilling Fluid Properties:

Depth (feet)	Weight (ppg)	Viscosity (sec/1000cc)	PV (cps)	YP (lb/100ft^2)	HPHT Fluid Loss (cc/30min)	pH (value)	LG Solids (%)
9,400' – 11,000'	8.4 – 10.0	29 – 30	0 – 1	0 – 1	N/C	9 – 10	<6

Drilling Fluid Recommendations:

Drill out from the 7" casing with existing fluid and continue circulating the remaining portion of the reserve. The pH should be maintained at 9.0-10.0 with additions of **Caustic Soda**. Sweep the hole with 100 barrels of fresh water with **New Gel** for a 80-90 sec/1000cc viscosity and 0.25-lbs of **Super Sweep** every 500 feet drilled to aid in cuttings removal. If losses occur batch treat with 12-15 ppb **Fiber Seal** in a 50 bbl premix with 36-40 sec/1000cc viscosity

***Calcium Carbonate will be used as the weighting agent in all pipe slugs, and mud weight increases. ABOSULTLEY NO BARITE WILL BE USED. If weights are needed above 12.0 ppg, Barite will only be used after a thorough discussion with the operator.**

Materials Consumption

300	sx	NewGel
30	sx	Paper
15	sx	Caustic Soda
1	bx	Super Sweep

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Maintenance Procedure: Interval 4

Fluid Loss - Fluid loss control is unnecessary through this interval.

Mud Weight - Maintain minimum fluid densities.

Alkalinity - Maintain pH in the 9.0-10.0 range with **Caustic**.

Hole Cleaning - Optimum hydraulics and rheological properties should be maintained to provide maximum hole cleaning and minimize washout of the well bore. Sweep the hole with fresh water mud pills made of **New Gel** for a 80-90 sec/1000cc viscosity and 0.25 ppb of **Super Sweep** every 500'.

Mud Losses Down hole - Loss of circulation is a possibility through this interval. Use **Fiber Plug** and **Fiber Seal**. Keep the hole full at all times, and avoid excessive swabbing and/or surge actions when tripping pipe. Bring pumps on the hole gradually anytime circulation has been interrupted, increasing pump strokes only after full returns are established.

Solids Control - Maintain low gravity solids at <6% by volume. Circulating the reserve will provide gravitational solids control.

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Interval 5: **6-1/8" Hole**
Interval: **11,000' – 12,800'**
Casing: **4-1/2"**
Days: **10**

Drilling Fluid Properties:

Depth (feet)	Weight (ppg)	Viscosity (sec/1000cc)	PV (cps)	YP (lb/100ft²)	HPHT Fluid Loss (cc/30min)	pH (value)	LG Solids (%)
11,000' – 12,800'	10.1 – 13.5	38 – 45	6 – 20	8 – 30	10 – 6 cc	9 – 10	<6

Drilling Fluid Recommendations:

At **11,000' TVD** ***(Estimated)*** or prior to drilling the **Strawn** Formation 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. If abnormal pressures are encountered mix **Calcium Carbonate** to increase mud weight and raise viscosity to 45+ sec/1000cc with **Dynazan**.

At **12,200' TVD** ***(Estimated)*** prior to drilling Morrow, reduce API filtrate to <6cc with **Starch** (White). If abnormal pressures are encountered mix **Calcium Carbonate** to increase mud weight and raise viscosity to 45+ sec/1000cc with **Dynazan**.

***Calcium Carbonate will be used as the weighting agent in all pipe slugs, and mud weight increases. ABOSULTLEY NO BARITE WILL BE USED. If weights are needed above 12.0 ppg, Barite will only be used after a thorough discussion with the operator.**

Materials Consumption:

185 tn Calcium Carbonate (bulk)
150 sx White Starch
100 tn Barite (bulk)
100 sx Dyna Fiber
80 sx Dynazan
40 sx Caustic Soda
30 cn S-10 Defoamer
25 cn Newcide

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Maintenance Procedure: Interval 5

Fluid Loss - Fluid loss control should be maintained with **Starch** (White)

Mud Weight - Maintain minimum fluid densities. Run water and premixes as needed to maintain volume and weight as specified. Drilling with a minimum amount of overbalance will reduce the possibility of losing returns and/or of differentially sticking the drill string.

Alkalinity - Maintain pH in the 9.0-10.0 range with **Caustic**.

Hole Cleaning - Optimum hydraulics and rheological properties should be maintained to provide maximum hole cleaning and minimize washout of the well bore. Sweeping the hole with fresh water mud pills made of **New Gel** for a 80-90 sec/1000cc viscosity and 0.25 ppb of **Super Sweep** every 500' will provide additional hole cleaning.

Mud Losses Down hole - Loss of circulation is a possibility through this interval. Use **Fiber Plug** and **Fiber Seal**. Keep the hole full at all times, and avoid excessive swabbing and/or surge actions when tripping pipe. Bring pumps on the hole gradually anytime circulation has been interrupted, increasing pump strokes only after full returns are established.

Solids Control - Maintain low gravity solids at <6% by volume. Circulating the reserve will provide gravitational solids control.

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ENGINEER / WAREHOUSE INFORMATION

WELL NAME: Rugar State 31 #1

LOCATION: Section 31, T-24-S, R-28-E
Eddy County, New Mexico

MUD ENGINEER: Wally Pearson Artesia, New Mexico
Lynn Pearson Carlsbad, New Mexico

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

WAREHOUSE: Artesia & Lovington, New Mexico
Oil Base Mud Plant Monahans, Texas
Water Base Mud Plant Monahans, Texas
(800) 592-4627 or (432) 697-8661. Both 24 hours

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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 or 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 Calcium Carbonate. 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.

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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 2nd 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.

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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.

HALLIBURTON

OGX Resources LLC
PO Box 11148
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Rugar State 31 1

Eddy County, New Mexico
United States of America
S:31 T:24S R:28E

Cementing Recommendation

Prepared for: Randy Ford
November 19, 2007
Version: 1

Submitted by:
Dennis Page
Halliburton
4000 N. Big Spring, Ste. 200
Midland, Texas 79705
432.683.0210

HALLIBURTON

Halliburton appreciates the opportunity to present this proposal and looks forward to being of service to you.

Foreword

Halliburton Energy Services is pleased to have this opportunity to present this proposal for your consideration. We earnestly request the service work to be performed on this well.

These Service Coordinators can be reached in our District, at the following phone numbers:

MIDLAND SALES OFFICE
1-800-844-8451

ODESSA DISTRICT
1-800-417-5096

CEMENTING:
Scott Kerby / Joe Briseno
BJ Wheeler

STIMULATION:
Mel Holt / Larry Staples
Basil Hacker

LOGGING &
PERFORATING
Allen Avera / Keith Drake
Mike Rehl

COILED TUBING
& NITROGEN
Michael Ybaben

TOOLS & TESTING,
PROD. SVCS., TCP,
COMPL. PRODUCTS
Steve Engleman

BAROID
Fernando Arizpe

HOBBS DISTRICT
1-800-416-6081

CEMENTING
Pete Garza / Ronald Arnold
Jaime Gonzales

STIMULATION:
Freddy Casillas / Jerry Thurman
Travis Laman

LOGGING &
PERFORATING
Darrell Merrell / Vernon Reever

TOOLS & TESTING,
PROD. SVCS., TCP,
COMPL. PRODUCTS
Mike McWilliams

BAROID
Freddy Redmon

PREPARED BY: Mauricio Sevilla

We look forward to working with you to provide the very best quality services available in the Permian Basin.

Dennis Page, Sr. Technical Advisor

Cementing Best Practices

1. **Cement quality and weight**: You must choose cement slurry that is designed to solve the problems specific to each string of pipe.

2. **Waiting time**: You must hold the cement slurry in place and under pressure until it hardens. A cement slurry is a time-dependent liquid and must be allowed to undergo a hydration reaction to produce a competent cement sheath. A fresh cement slurry can be worked (thickening or pump time) as long as it is plastic, and the initial set of cement occurs during the rapid reaction stage. If the cement is not allowed to hydrate; it will be subject to changes in density, dilution, settling, water separation, and gas cutting that can lead to lack of zonal isolation with resultant bridging in the annulus.

3. **Pipe movement**: Pipe movement may be one of the single most influential factors in mud removal. Reciprocation and/or rotation mechanically breaks up gelled mud and constantly changes the flow patterns in the annulus for better cement bonding.

4. **Mud properties:** Plastic viscosity (PV) should be less than 15 centipoise (cp), and less than 10 cp, if possible, yield point (YP) should be less than 10 pound/100-square feet (lb/100ft^2) decreasing down to about 5 lb/100 ft^2.

5. **Mud gel strength**: A nonthixotropic mud is desirable for good mud removal. Mud left in the hole prior to running casing should have 10-second/10-minute/30-minute gel strength such that the 10-minute is less than double the 10-second and the 30-minute is less than 20 lb/100 ft^2). Sufficient shear strength may not be achieved on a primary cement job to remove mud left in the hole should the mud develop more than 25 lb/100 ft^2.

6. **Mud fluid loss**: Decreasing the filtrate loss into a permeable zone enhances the creation of a thin filter cake. This increases the fluid mud in the hole, which is more easily removed. Generally, an API fluid loss of 7 or 8 milliliter (ml) is sufficient with high-temperature/high-pressure fluid loss (HTHP) no more than double this amount.

7. **Circulation**: Circulate bottoms up twice, or until well conditioned mud is being returned to the surface. There should be no cutting in the mud returns. An annular velocity of 260 feet per minute is optimum (SPE/IADC 18617), if possible.

8. **Flow rate**: Turbulent flow is more desirable flow regime for mud removal. If turbulence cannot be achieved, better mud removal is found when maximum flow energy is used. The maximum pump rate should be determined to obtain the best flow regime.

9. **Hole size**: The optimum hole size recommended for good mud removal is 1.5 to 2 inches larger than the casing or liner size. Hole sizes larger than 2 inches annular space can be dealt with, but those that are smaller than 1.5 inches present difficult problems.

10. **Pipe Centralization**: This helps to create a uniform flow area perpendicular to flow direction. Cement will take the path of least resistance so that centralization is important in keeping the pipe off the walls of the hole. At least a 70 percent standoff should be achieved for centralization.

11. **Rat hole**: When applicable, a weighted viscous pill in the rat hole prevents cement from swapping with lighter weight mud when displacement stops.

12. **Shoe joint**: A shoe joint is recommended on all primary casings and liners. The length of the shoe joint will vary, although the absolute minimum length is one joint of pipe. If conditions exist, such as not running a bottom plug, two joints should be the minimum length.

Job Information — Surface Casing

Rugar State 31	1
17-1/2" Hole	0 - 520 ft (MD)
Inner Diameter	17.500 in
Surface Casing	0 - 520 ft (MD)
Outer Diameter	13.375 in
Inner Diameter	12.615 in
Linear Weight	54.50 lbm/ft

Job Recommendation

Install floating equipment, run casing to bottom, and circulate a minimum of 2-3 hole volumes prior to cementing as follows:

Fluid Instructions

Fluid 1: Precede cement with 20 bbl Fresh Water — Fluid Volume: 20 bbl

Fluid 2: 1st Lead Cement - 200 sks

Premium Plus Cement		Fluid Weight	14.60 lbm/gal
94 lbm/sk	Premium Plus Cement (Cement)	Slurry Yield:	1.39 ft^3/sk
1 %	Calcium Chloride (Accelerator)	Total Mixing Fluid:	5.64 Gal/sk
10 lbm/sk	Gilsonite (Lost Circulation Additive)	Volume:	49.59 bbl
0.125 lbm/sk	Poly-E-Flake (Lost Circulation Additive)	Proposed Sacks:	200 sks

Fluid 3: 2nd Lead Cement - 300 sks

Halliburton Light Premium Plus		Fluid Weight	12.70 lbm/gal
0.125 lbm/sk	Poly-E-Flake (Lost Circulation Additive)	Slurry Yield:	1.88 ft^3/sk
1 %	Calcium Chloride (Accelerator)	Total Mixing Fluid:	10.29 Gal/sk
		Volume:	100.67 bbl
		Proposed Sacks:	300 sks

Fluid 4: Tail Cement - 200 sks

Premium Plus Cement		Fluid Weight	14.80 lbm/gal
94 lbm/sk	Premium Plus Cement (Cement)	Slurry Yield:	1.34 ft^3/sk
1 %	Calcium Chloride (Accelerator)	Total Mixing Fluid:	6.36 Gal/sk
		Volume:	47.59 bbl
		Proposed Sacks:	200 sks

Job Information — 1st Intermediate Casing

Rugar State 31	1
Surface Casing	0 - 520 ft (MD)
Outer Diameter	13.375 in
Inner Diameter	12.615 in
Linear Weight	54.50 lbm/ft
12-1/4" Hole	520 - 2100 ft (MD)
Inner Diameter	12.250 in
1st Intermediate Casing	0 - 2100 ft (MD)
Outer Diameter	9.625 in
Inner Diameter	8.921 in
Linear Weight	36 lbm/ft
Thread	LTC
Casing Grade	J-55
TOC	1700 ft

Install floating equipment, run casing to bottom, and circulate a minimum of 2-3 hole volumes prior to cementing as follows:

Fluid Instructions

Fluid 1: Precede cement with 20 bbl Fresh Water		Fluid Volume:	20 bbl
Fluid 2: Lead with 600 sks			
50/50 Poz Premium Plus		Fluid Weight	11.80 lbm/gal
10 % Total	Bentonite (Light Weight Additive)	Slurry Yield:	2.50 ft^3/sk
5 %	Salt (Salt)	Total Mixing Fluid:	14.04 Gal/sk
5 lbm/sk	Gilsonite (Lost Circulation Additive)	Volume:	266.84 bbl
0.25 %	D-AIR 3000 (Defoamer)	Proposed Sacks:	600 sks
Fluid 3: Tail-in with 200 sks			
Premium Plus Cement		Fluid Weight	14.80 lbm/gal
94 lbm/sk	Premium Plus Cement (Cement)	Slurry Yield:	1.34 ft^3/sk
1 %	Calcium Chloride (Accelerator)	Total Mixing Fluid:	6.36 Gal/sk
		Volume:	47.59 bbl
		Proposed Sacks:	200 sks

Job Information — 2nd Intermediate Casing

Rugar State 31	1
1st Intermediate Casing	0 - 2100 ft (MD)
Outer Diameter	9.625 in
Inner Diameter	8.921 in
Linear Weight	36 lbm/ft
Thread	LTC
Casing Grade	J-55
8-3/4" Hole	2100 - 9400 ft (MD)
Inner Diameter	8.750 in
2nd Intermediate Casing	0 - 9400 ft (MD)
Outer Diameter	7.000 in
Inner Diameter	6.276 in
Linear Weight	26 lbm/ft
Thread	LTC
Casing Grade	P-110
TOC	1000 ft

Job Recommendation

Install floating equipment, run casing to bottom, and circulate a minimum of 2-3 hole volumes prior to cementing as follows:

Fluid Instructions

Fluid 1: Precede cement with 1000 gallons
SUPER FLUSH 102 — Fluid Volume: 23.80 bbl

Fluid 2: Lead with 850 sks
50/50 Poz Premium — Fluid Weight: 11.80 lbm/gal

10 % Total	Bentonite (Light Weight Additive)	Slurry Yield:	2.50 ft^3/sk
0.3 %	Halad(R)-9 (Low Fluid Loss Control)	Total Mixing Fluid:	14.60 Gal/sk
5 %	Salt (Salt)	Volume:	378.17 bbl
0.125 lbm/sk	Poly-E-Flake (Lost Circulation Additive)	Proposed Sacks:	850 sks

Fluid 3: Tail-in with 200 sks
Premium Cement — Fluid Weight: 15.60 lbm/gal

94 lbm/sk	Premium Cement (Cement)	Slurry Yield:	1.19 ft^3/sk
0.5 %	Halad(R)-9 (Low Fluid Loss Control)	Total Mixing Fluid:	5.35 Gal/sk
		Volume:	42.46 bbl
		Proposed Sacks:	200 sks

Rugar State 31	1
2nd Intermediate Casing	0 - 9400 ft (MD)
Outer Diameter	7.000 in
Inner Diameter	6.276 in
Linear Weight	26 lbm/ft
Thread	LTC
Casing Grade	P-110
6-1/8" Hole	9400 - 13000 ft (MD)
Inner Diameter	6.125 in
Production Liner	9100 - 13000 ft (MD)
Outer Diameter	4.500 in
Inner Diameter	4.000 in
Linear Weight	11.60 lbm/ft
Casing Grade	N-80
Drill Pipe	0 - 9100 ft (MD)
Outer Diameter	4.500 in
Top of Cement	8800 ft (MD)
Top of Liner	9100 ft (MD)
Lap	300 ft (MD)
Cap	300 ft (MD)
Mud Type	Water Based Mud
Mud Weight	11 lbm/gal
BHST	210 degF

Install floating equipment, run casing to bottom, and circulate a minimum of 2-3 hole volumes prior to cementing as follows:

Fluid Instructions

Fluid 1: Pump 1000 gallons
10# Brine Water

Fluid Volume:	23.81 bbl

Fluid 2: Mix and pump 485 sks
Premium Cement

94 lbm/sk	Premium Cement (Cement)	Fluid Weight	15.60 lbm/gal
0.5 %	LAP-1 (Low Fluid Loss Control)	Slurry Yield:	1.20 ft^3/sk
0.4 %	CFR-3 (Dispersant)	Total Mixing Fluid:	5.33 Gal/sk
0.25 %	D-AIR 3000 (Defoamer)	Volume:	103.40 bbl
0.2 %	HR-5 (Retarder)	Proposed Sacks:	485 sks

Rugar State 31	1
2nd Intermediate Casing	0 - 9400 ft (MD)
Outer Diameter	7.000 in
Inner Diameter	6.276 in
Linear Weight	26 lbm/ft
Thread	LTC
Casing Grade	P-110
6-1/8" Hole	9400 - 13000 ft (MD)
Inner Diameter	6.125 in
Drill Pipe	0 - 9100 ft (MD)
Production Liner	9100 - 13000 ft (MD)
Outer Diameter	4.500 in
Inner Diameter	4.000 in
Linear Weight	11.60 lbm/ft
Casing Grade	N-80
Top of Cement	8800 ft (MD)
Top of Liner	9100 ft (MD)
Lap	300 ft (MD)
Cap	300 ft (MD)
Mud Type	Water Based Mud
Mud Weight	11 lbm/gal
BHST	210 degF

Install floating equipment, run casing to bottom, and circulate a minimum of 2-3 hole volumes prior to cementing as follows:

Fluid Instructions

Fluid 1: Pump 1000 gallons
10# Brine Water — Fluid Volume: 23.81 bbl

Fluid 2: Mix and pump 485 sks
Premium Acid Soluable Cement — Fluid Weight: 15 lbm/gal

0.3 %	HR-601 (Retarder)	Slurry Yield:	2.62 ft^3/sk
10 lbm/sk	Silicalite 50/50 (Light Weight Additive)	Total Mixing Fluid:	11.34 Gal/sk
0.25 lbm/sk	D-AIR 3000 (Defoamer)	Volume:	103.40 bbl
0.7 %	Halad®-344 (Low Fluid Loss Control)	Proposed Sacks:	225 sks

Conditions

NOTE

The cost in this analysis is good for the materials and/or services outlined within and shall be valid for 30 days from the date of this proposal. In order to meet your needs under this proposal with a high quality of service and responsive timing, Halliburton will be allocating limited resources and committing valuable equipment and materials to your area of operations. Accordingly, the discounts reflected in this proposal are available only for materials and services awarded on a first-call basis. Alternate pricing may apply in the event that Halliburton is awarded work on any basis other than as a first-call provider.

The unit prices stated in the proposal are based on our current published prices. The projected equipment, personnel, and material needs are only estimates based on information about the work presently available to us. At the time the work is actually performed, conditions then existing may require an increase or decrease in the equipment, personnel, and/or material needs. Charges will be based upon unit prices in effect at the time the work is performed and the amount of equipment, personnel, and/or material actually utilized in the work. Taxes, if any, are not included. Applicable taxes, if any, will be added to the actual invoice.

It is understood and agreed between the parties that with the exception of the subject discounts, all services performed and equipment and materials sold are provided subject to Halliburton's General Terms and Conditions contained in our current price list, (which include LIMITATION OF LIABILITY and WARRANTY provisions), and pursuant to the applicable Halliburton Work Order Contract (whether or not executed by you), unless a Master Service and/or Sales Contract applicable to the services, equipment, or materials supplied exists between your company and Halliburton, in which case the negotiated Master Contract shall govern the relationship between the parties. A copy of the latest version of our General Terms and Conditions is available from your Halliburton representative or at: http://www.halliburton.com/hes/general_terms_conditions.pdf for your convenient review, and we would appreciate receiving any questions you may have about them. Should your company be interested in negotiating a Master Contract with Halliburton, our Law Department would be pleased to work with you to finalize a mutually agreeable contract. In this connection, it is also understood and agreed that Customer will continue to execute Halliburton usual field work orders and/or tickets customarily required by Halliburton in connection with the furnishing of said services, equipment, and materials.
Any terms and conditions contained in purchase orders or other documents issued by the customer shall be of no effect except to confirm the type and quantity of services, equipment, and materials to be supplied to the customer.
If customer does not have an approved open account with Halliburton or a mutually executed written contract with Halliburton, which dictates payment terms different than those set forth in this clause, all sums due are payable in cash at the time of performance of services or delivery of equipment, products, or materials. If customer has an approved open account, invoices are payable on the twentieth day after date of invoice.

Customer agrees to pay interest on any unpaid balance from the date payable until paid at the highest lawful contract rate applicable, but never to exceed 18% per annum. In the event Halliburton employs an attorney for collection of any account, customer agrees to pay attorney fees of 20% of the unpaid account, plus all collection and court costs.