

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

Form C-101
May 27, 2004

RECEIVED

Submit to appropriate District Office

FEB 13 2006

☐ AMENDED REPORT

OCD-ARTESIA

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

¹ Operator Name and Address OGX Resources LLC P.O. Box 2064 Midland, Texas 79702		² OGRID Number 217955
		³ API Number 30 - 015-33852
⁴ Property Code 33440	⁵ Property Name Second Chance Federal Com	
		⁶ Well No. #1
⁹ Proposed Pool 1 Wildcat; Morrow (Gas)		¹⁰ Proposed Pool 2

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
P	29	24S	28E		700'	South	700'	East	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 NW	¹² Well Type Code G	¹³ Cable/Rotary R	¹⁴ Lease Type Code P	¹⁵ Ground Level Elevation 2978'
¹⁶ Multiple N	¹⁷ Proposed Depth 13,000'	¹⁸ Formation Morrow	¹⁹ Contractor	²⁰ Spud Date 3/01/2006
Depth to Groundwater 212'		Distance from nearest fresh water well Over 1000'		Distance from nearest surface water Over 1000'
Pit: Liner: Synthetic <input checked="" type="checkbox"/> 12 mils thick Clay <input type="checkbox"/> Pit Volume: 1100 bbls Drilling Method: Closed-Loop System <input type="checkbox"/> Fresh Water <input checked="" type="checkbox"/> Brine <input checked="" type="checkbox"/> Diesel/Oil-based <input type="checkbox"/> Gas/Air <input type="checkbox"/>				

21 Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
17.5	13.375	48	650	700	0
12.25	9.625	36	2600	920	0
8.75	7	26	10000	1430	1000
6.125	4.5	11.6	13000	250	9600

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.

Drill, case and complete well in the Morrow formation.

BOP's include: 1) Hydrill Double Ram 11" X 5000 psi

2) Double Ram 11" X 5000 psi

3) Choke Manifold 3" X 5000 psi

4) Three Station Accumulator Closing Unit with Remote Control

Sources at OGX Resources LLC advised me that they do not anticipate enough H2S from the surface to TD to meet the OCD's minimum requirements for the submission of a contingency plan per Rule 118, however H2S monitoring equipment will be on location from below surface casing to TD.

Mud program attached.

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 ☐

Printed name: Lindsay Truesdell

Title: Consultant

E-mail Address: Lindsay@rkford.com

Date: 02/03/2006

Phone: 432-682-0440

OIL CONSERVATION DIVISION

Approved by

Title:

Approval Date:

Conditions of Approval Attached ☐

Expiration Date:

Salt > 9.5

DISTRICT I
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DISTRICT II
811 South First, Artesia, NM 88210

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1000 Rio Brazos Rd., Aztec, NM 87410

DISTRICT IV
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources Department

Form C-102
Revised March 17, 1999

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

OIL CONSERVATION DIVISION

2040 South Pacheco
Santa Fe, New Mexico 87504-2088

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code 96070	Pool Name Wildcat; Morrow (Gas)
Property Code 34400	Property Name SECOND CHANCE FEDERAL COM	Well Number 1
OGRID No. 217955	Operator Name OGX RESOURCES, LLC	Elevation 2978'

Surface Location

UL or lot No. P	Section 29	Township 24 S	Range 28 E	Lot Idn	Feet from the 700	North/South line SOUTH	Feet from the 700	East/West line EAST	County EDDY
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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 320	Joint or Infill	Consolidation Code	Order No.						

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	
				<p>I hereby certify the the information contained herein is true and complete to the best of my knowledge and belief.</p> <p><i>Lindsay Truesdell</i> Signature Lindsay Truesdell Printed Name Consultant Title 02/03/2006 Date</p>	
				SURVEYOR CERTIFICATION	
				<p>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 supervision, and that the same is true and correct to the best of my belief.</p> <p>October 28, 2004 Date Surveyed Signature & Seal Professional Surveyor W.D. No. 4750 Certificate No. Gary Jones 7977 JLP BASIN SURVEYS</p>	
				<p>Lat.: N32°10'59.4" Long.: W104°06'12.0"</p> <p>2996.6' 2980.7' 2969.0' 2982.4' 700' 700'</p>	

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Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
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Form C-144
June 1, 2004

For drilling and production facilities, submit to appropriate NMOCD District Office.
For downstream facilities, submit to Santa Fe office

Pit or Below-Grade Tank Registration or Closure

Is pit or below-grade tank covered by a "general plan"? Yes ☐ No ☐

Type of action: Registration of a pit or below-grade tank ☐ Closure of a pit or below-grade tank ☐

Operator: <u>OGX Resources LLC</u> Telephone: <u>432-685-1287</u> Email address: <u>kjp@ogxresources.com</u>		
Address: <u>P.O. Box 2064 Midland, Texas 79702</u>		
Facility or well name: <u>Second Chance Fed Com # 30-015-33852</u> U/L or Qtr/QtrP <u>Sec 29 T24S R8E</u>		
County: <u>Eddy</u> Latitude _____ Longitude _____ NAD: 1927 <input type="checkbox"/> 1983 <input type="checkbox"/> Surface Owner Federal <input type="checkbox"/> State <input checked="" type="checkbox"/> Private <input type="checkbox"/> Indian <input type="checkbox"/>		
Pit Type: Drilling <input checked="" type="checkbox"/> Production <input type="checkbox"/> Disposal <input type="checkbox"/> Workover <input type="checkbox"/> Emergency <input type="checkbox"/> Lined <input checked="" type="checkbox"/> Unlined <input type="checkbox"/> Liner type: Synthetic <input checked="" type="checkbox"/> Thickness <u>12</u> mil Clay <input type="checkbox"/> Pit Volume <u>1100</u> bbl	Below-grade tank Volume: _____ bbl Type of fluid: _____ Construction material: _____ Double-walled, with leak detection? Yes <input type="checkbox"/> If not, explain why not: _____	RECEIVED DEC 29 2004 OGX-ARTESIA
Depth to ground water (vertical distance from bottom of pit to seasonal high water elevation of ground water.)	Less than 50 feet (20 points) 50 feet or more, but less than 100 feet (10 points) <u>100 feet or more</u> (0 points)	0 points
Wellhead protection area: (Less than 200 feet from a private domestic water source, or less than 1000 feet from all other water sources.)	Yes (20 points) <u>No</u> (0 points)	0 points
Distance to surface water: (horizontal distance to all wetlands, playas, irrigation canals, ditches, and perennial and ephemeral watercourses.)	Less than 200 feet (20 points) 200 feet or more, but less than 1000 feet (10 points) <u>1000 feet or more</u> (0 points)	0 points
Ranking Score (Total Points)		0 points

If this is a pit closure: (1) attach a diagram of the facility showing the pit's relationship to other equipment and tanks. (2) Indicate disposal location: (check the onsite box if you are burying in place) onsite ☐ offsite ☐ If offsite, name of facility: _____ (3) Attach a general description of remedial action taken including remediation start date and end date. (4) Groundwater encountered: No ☐ Yes ☐ If yes, show depth below ground surface _____ ft. and attach sample results. (5) Attach soil sample results and a diagram of sample locations and excavations.

Additional Comments:

I hereby certify that the information above is true and complete to the best of my knowledge and belief. I further certify that the above-described pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☒, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.

Date: 12-01-2004

Printed Name/Title Frank Agar, Jr.

Signature 

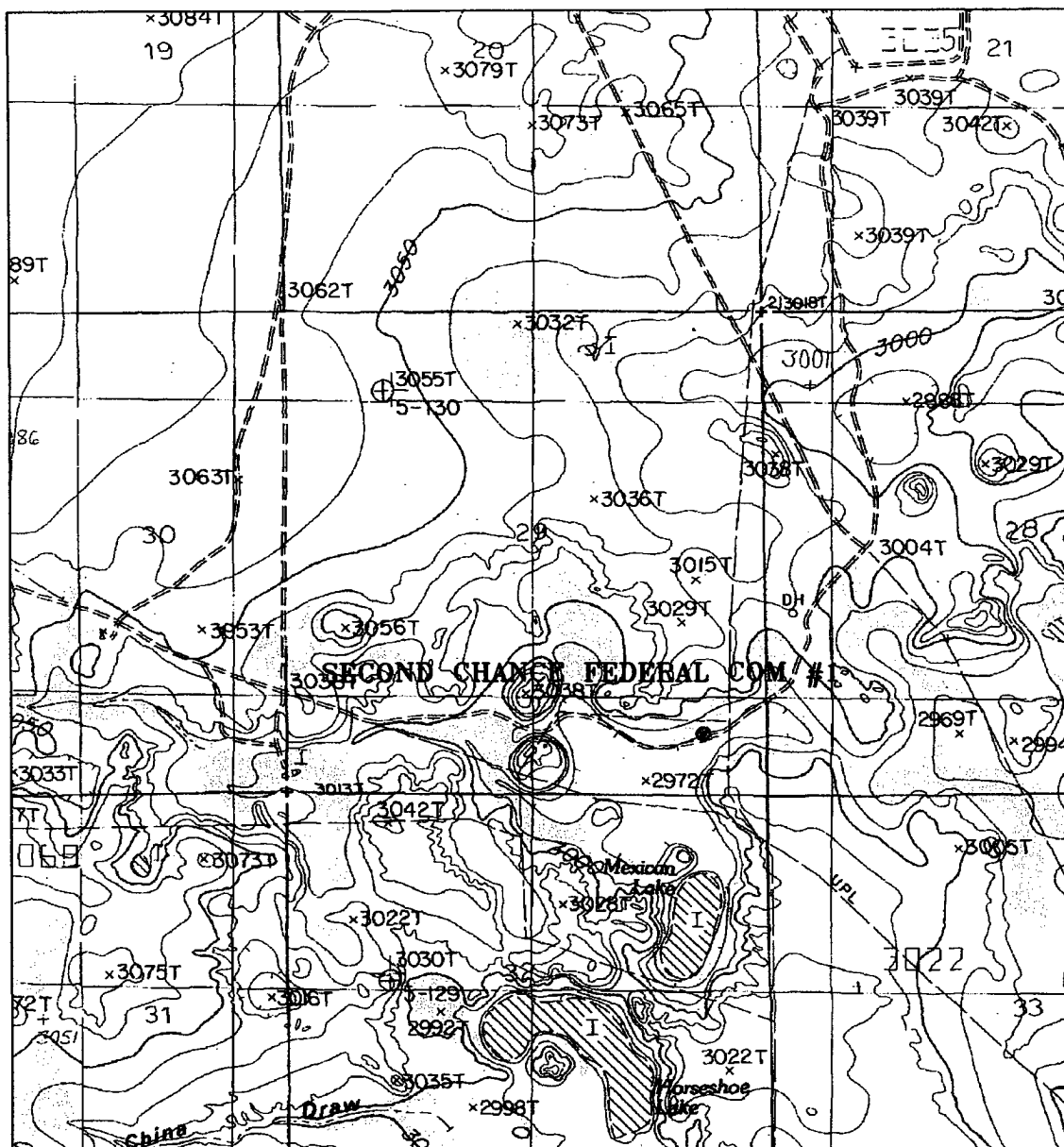
Your certification and NMOCD approval of this application/closure does not relieve the operator of liability should the contents of the pit or tank contaminate ground water or otherwise endanger public health or the environment. Nor does it relieve the operator of its responsibility for compliance with any other federal, state, or local laws and/or regulations.

Approval:

Printed Name/Title Wild Dog

Signature 

JAN 3 2005



SECOND CHENCE FEDERAL COM #1
 Located at 700' FSL and 700' FEL
 Section 29, Township 24 South, Range 24 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

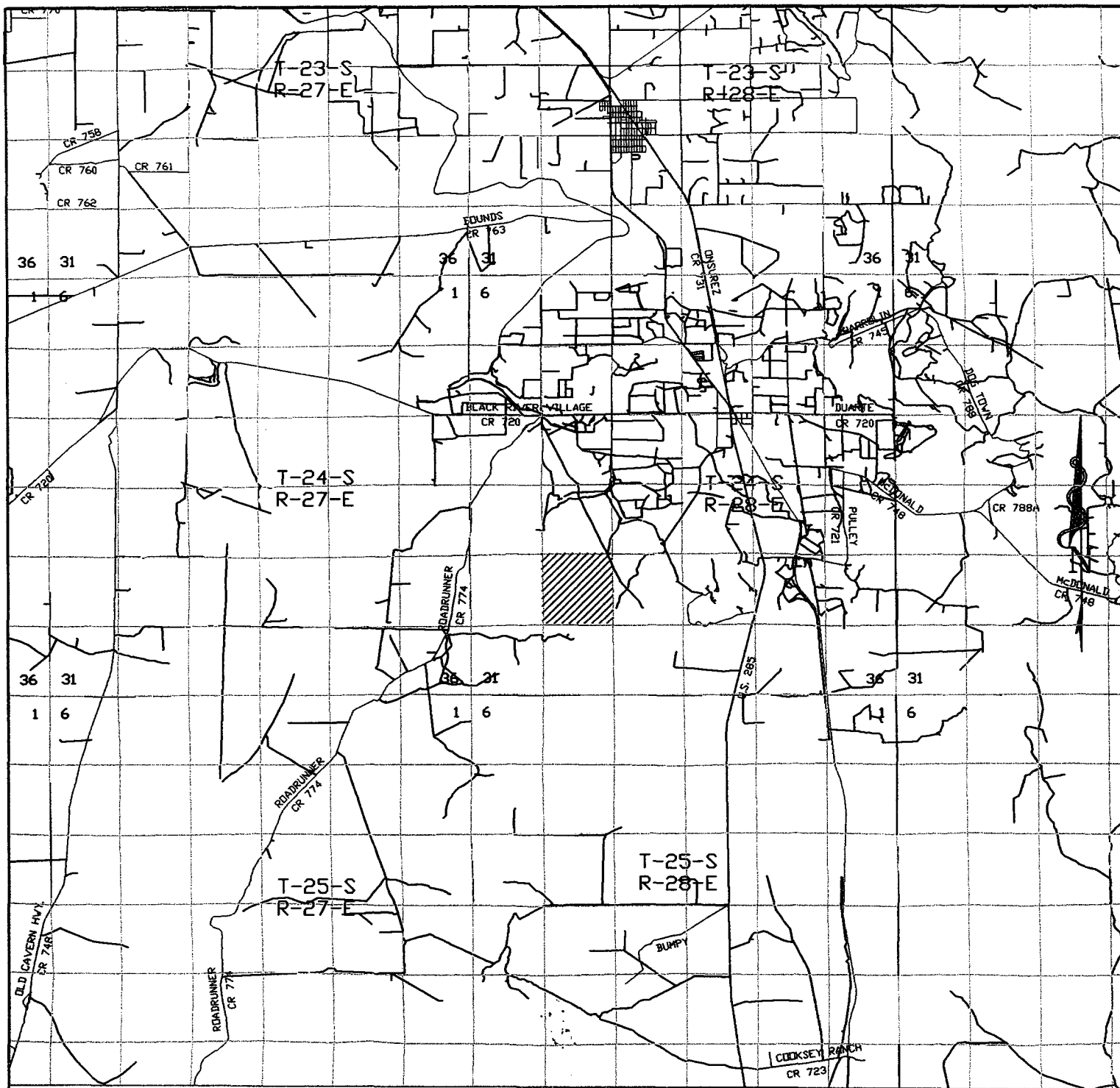
W.O. Number: 4760AA - JLP #1

Survey Date: 10/28/04

Scale: 1" = 2000'

Date: 11/01/04

OGX
RESOURCES,
LLC



SECOND CHENCE FEDERAL COM #1
 Located at 700' FSL and 700' FEL
 Section 29, Township 24 South, Range 24 East,
 N.M.P.M., Eddy County, New Mexico.



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: 4760AA - JLP #1

Survey Date: 10/28/04

Scale: 1" = 2000'

Date: 11/01/04

**OGX
 RESOURCES,
 LLC**



Newpark Drilling Fluids, LLC



DRILLING FLUIDS PROGRAM

PREPARED FOR:

Second Chance Federal Com #1

*Section 29, T-24-S, R-28-E
Eddy County, New Mexico*

RECEIVED

FEB 13 2006

OGD-ARTESIA

SUBMITTED TO:

Mr. Steve Douglas

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

PREPARED BY:

Ken Anthony



Newpark Drilling Fluids, LLC



February 6, 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 Second Chance Federal Com #1 in section 29, 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 \$ 150,000.00 - \$ 160,000.00 based on 45-50 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.

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

Sincerely,

Ken Anthony



Newpark Drilling Fluids, LLC



OGX Resources, LLC

Second Chance Federal Com #1
Section 29, T-24-S, R-28-E
Eddy County, New Mexico

Mud Program Summary

<u>Depth</u>	<u>Hole Size</u>	<u>Casing</u>	<u>Mud Wt.</u>	<u>Viscosity</u>	<u>Fluid Loss</u>	<u>pH</u>
0' – 650'	17-1/2"	13-3/8"	8.6-9.0	32-36	N/C	N/C
650' – 2,600'	12-1/4"	9-5/8"	9.9-10.0	28-29	N/C	9-10
2,600' – 10,000'	8-3/4"	7-5/8"	8.4-9.2	28-29	N/C	9-10
10,000' – 10,800'	6-1/2"	-	9.2-10.1	28-29	N/C	9-10
10,800' – 13,000'	6-1/2"	5-1/2"	10.1-13.5	38-45	6-10	9-9.5

Potential Problems

17-1/2" Surface Interval 0 – 650'

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

12-1/4" Intermediate Interval 650' – 2,600'

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

8-3/4" Interval 2,600' – 10,000'

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

6-1/8" Interval 10,000' – 10,800'

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

6-1/8" Interval 10,800' – 12,400'

- Severe seepage.
- Deviation.
- Abnormal pressure development (Strawn and Atoka).



Newpark Drilling Fluids, LLC



OGX Resources, LLC

Second Chance Federal Com #1

Section 29, T-24-S, R-28-E

Eddy County, New Mexico

17-1/2" Surface Interval

Interval: 0 – 650'
Hole Size: 17-1/2"
Casing Size: 13-3/8"
Total Days: 2
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 **NewGel/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:

150	sx	New Gel
10	sx	Soda Ash
10	sx	Lime
5	sx	Paper
1	bx	Super Sweep



Newpark Drilling Fluids, LLC



OGX Resources, LLC

Second Chance Federal Com #1

Section 29, T-24-S, R-28-E

Eddy County, New Mexico

12-1/4" Intermediate Interval

Interval: 650' – 2,600'
Hole Size: 12-1/4"
Casing Size: 9-5/8"
Total Days: 6
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 two gallons of **New-55** every 250 feet drilled to promote solids settling. 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
30	sx	Paper
15	sx	Caustic Soda
2	cn	New-55
2	bx	Super Sweep



Newpark Drilling Fluids, LLC



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Second Chance Federal Com #1
Section 29, T-24-S, R-28-E
Eddy County, New Mexico

8-3/4" Hole Interval

Interval: 2,600' – 10,000'
Hole Size: 8-3/4"
Casing Size: 7-5/8"
Total Days: 16
Mud Type: Fresh Water to Brine
Properties:
 Weight: 8.4 – 9.2 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
85	sx	Paper
45	sx	Caustic Soda
15	cn	New-55
10	bx	Super Sweep



Newpark Drilling Fluids, LLC



OGX Resources, LLC

Second Chance Federal Com #1
Section 29, T-24-S, R-28-E
Eddy County, New Mexico

6-1/2" Interval 10,000' – 10,800'

Interval: 10,000' – 10,800'
Hole Size: 6-1/2"
Casing Size: -
Total Days: 2
Mud Type: Brine
Properties:
 Weight: 9.2 – 10.0 ppg
 Viscosity: 28 – 29 sec/1000cc
 Filtrate: N/C
 pH: 9 – 10

Interval Discussion:

Drill out from 7-5/8" casing with the 9.2-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. Maintain sufficient brine water on location to raise mud weight if abnormal pressures are encountered.

Materials Consumption & Cost:

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



Newpark Drilling Fluids, LLC



OGX Resources, LLC

Second Chance Federal Com #1

Section 29, T-24-S, R-28-E

Eddy County, New Mexico

6-1/2" Interval 10,800'-13,200'

Interval: 10,800' – 13,200'
Hole Size: 6-1/2"
Casing Size: 5-1/2"
Total Days: 24
Mud Type: Dynazan-New Pac-Starch (white)-Barite
Properties:
 Weight: 10.1 – 12.5 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**. Mix **Starch** (White) to control API filtrate at <10cc. Mix **Dynazan** to increase the viscosity to 38-40 sec/1000cc. Use **No-Foam S** to reduce foaming. Small amounts of **Desco** will modify the rheology. Mix **Barite** to increase fluid density to balance formation pressures encountered. For seepage mix **Dynafiber**, for total losses, see the Lost Circulation section of this program.

At **12,000'**, reduce API filtrate to <8cc with **Starch** (white). If abnormal pressures are encountered mix **Barite** to increase mud weight. Raise viscosity to 45 sec/1000cc with **Dynazan**.

Materials Consumption & Cost:

350	tn	Barite (bulk)
160	sx	Starch
120	sx	Dynazan
120	sx	Dynafiber
120	sx	Fiber Seal
85	sx	Caustic Soda
35	cn	Newcide
30	sx	S-10 Defoamer
20	cn	Desco



Newpark Drilling Fluids, LLC



OGX Resources, LLC

Second Chance Federal Com #1
Section 29, T-24-S, R-28-E
Eddy County, New Mexico

ENGINEER / WAREHOUSE INFORMATION

WELL NAME: Second Chance Federal Com # 1

LOCATION: Section 29, T-24-S, R-28-E
Eddy County, New Mexico

MUD ENGINEER: Lynn Pearson Carlsbad, New Mexico
Bill Stewart Hobbs, New Mexico
Mike Davis Denver City, Texas

(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.



Newpark Drilling Fluids, LLC



OGX Resources, LLC

Second Chance Federal Com #1

Section 29, T-24-S, R-28-E

Eddy County, New Mexico

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 (floculated 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.



Newpark Drilling Fluids, LLC



OGX Resources, LLC

Second Chance Federal Com #1
Section 29, T-24-S, R-28-E
Eddy County, New Mexico

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.



Newpark Drilling Fluids, LLC



OGX Resources, LLC

Second Chance Federal Com #1

Section 29, T-24-S, R-28-E

Eddy County, New Mexico

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.
- Centrifuges

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.

Centrifuges

Two centrifuges set up in "piggy-back" sequence would provide adequate solids removal. The first centrifuge provides barite recovery, the second centrifuge would take the effluent from the first centrifuge and clean the low-gravity solids before returning the fluid to the active system.



Newpark Drilling Fluids, LLC



OGX Resources, LLC

Second Chance Federal Com #1

Section 29, T-24-S, R-28-E

Eddy County, New Mexico

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.

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

PV = Plastic Viscosity

YP = Yield Point

M = Mud Weight (ppg)

Dh = Diameter of hole (inches)

Dp = Diameter of pipe (inches)

VC = Critical Velocity in feet per second.



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Section 29, T-24-S, R-28-E
Eddy County, New Mexico

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. Secondly, 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.



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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.