OCD Hobbs

HOBBS OCD ATS-15-1007

NOV 30 2015

RECEIVED

Form 3160-3
(March 2012)

FORM APPROVED
OMB No. 1004-0137
Expires October 31, 2014

(H)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.
SL:LC-029509B BL:LC-054687

6. If Indian, Allotee or Tribe Name
N/A

1a. Type of work: ☑ DRILL ☐ REENTER

7. If Unit or CA Agreement, Name and No.
N/A

1b. Type of Well: ☑ Oil Well ☐ Gas Well ☐ Other ☑ Single Zone ☐ Multiple Zone

8. Lease Name and Well No. (314751)
Ivar the Boneless Federal #24H

2. Name of Operator COG Operating LLC (229137)

9. API Well No.
30-025- 42967

3a. Address One Concho Center, 600 W. Illinois Ave
Midland, TX 79701

3b. Phone No. *(include area code)*
432-685-4385

10. Field and Pool, or Exploratory (44500)
Maljamar; Yeso, West

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*
At surface SHL: 120' FNL & 2380' FWL, Unit C, Sec 22
At proposed prod. zone BHL: 330' FNL & 2310' FWL, Unit C, Sec 15

UNORTHODOX LOCATION

11. Sec., T. R. M. or Blk. and Survey or Area
Sec 22 & 15, T17S, R32E

14. Distance in miles and direction from nearest town or post office*
2 miles from Loco Hills, NM

12. County or Parish
LEA

13. State
NM

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 120'

16. No. of acres in lease
SHL: 520
BHL: 400

17. Spacing Unit dedicated to this well
160

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. 532.9'

19. Proposed Depth
TVD: 6271' MD: 11208'
EOC: 6350' TVD

20. BLM/BIA Bond No. on file
NMB000740; NMB000215

21. Elevations (Show whether DF, KDB, RT, GL, etc.)
4019' GL

22. Approximate date work will start*
01/30/2016

23. Estimated duration
15 Days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification
6. Such other site specific information and/or plans as may be required by the BLM.

25. Signature

Name *(Printed/Typed)*
Kelly J. Holly

Date
08/28/2015

Title
Permitting Tech

Approved by *(Signature)* Steve Caffey

Name *(Printed/Typed)*

Date NOV 19 2015

Title
FIELD MANAGER

Office
CARLSBAD FIELD OFFICE

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.
Conditions of approval, if any, are attached.

APPROVAL FOR TWO YEARS

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Continued on page 2)

*(Instructions on page 2)

Roswell Controlled Water Basin

KZ
11/30/15

Approval Subject to General Requirements & Special Stipulations Attached

SEE ATTACHED FOR CONDITIONS OF APPROVAL

DEC 01 2015

COG Operating LLC
Ivar the Boneless Federal #24H

1. Geologic Formations

TVD of target	6350'	Pilot hole depth	NA
MD at TD:	11208'	Deepest expected fresh water:	132'

Back Reef

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Fresh Water	
Rustler	832'	Brackish Water	
Top of Salt	1035'	Salt	
Tansill	2042'	Barren	
Yates	2145'	Oil/Gas	
Seven Rivers	2508'	Oil/Gas	
Queen	3099'	Oil/Gas	
Grayburg	3491'	Oil/Gas	
San Andres	3882'	Oil/Gas	
Glorieta	5377'	Oil/Gas	
Paddock	5463'	Oil/Gas	
Blinebry	5946'	Target	
Tubb	6839'	Will not penetrate	

*H2S, water flows, loss of circulation, abnormal pressures, etc.

See COA

2. Casing Program

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
17.5"	0	~~857'~~ 970	13.375"	48	H40/J55	STC	1.89	3.28	7.83
12.25"	0	~~2062'~~ 2170'	9.625"	40	J55	LTC	2.40	1.30	6.30
8.75"	0	5829'	7.0"	29	L80	LTC	3.17	1.33	2.25
8.75"	5829'	6656'	5.5"	17	L80	LTC	2.55	1.26	3.70
7.875"	6656'	11208'	5.5"	17	L80	LTC	2.55	1.26	7.59
				BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h
BLM standard formulas where used on all SF calculations
Assumed 9.2 ppg MW equivalent pore pressure from 9 5/8" shoe to Deepest TVD in wellbore.

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Is casing API approved? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary.	N
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

3. Cementing Program

Casing	# Sks	Wt. lb/gal	Yld ft3/sk	H_20 gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf. Single Stage	275	13.5	1.75	9.2	13	Lead: Class C + 4% Gel +2% $CaCl_2$ + 0.25 pps CF
	375	14.8	1.32	6.3	6	Tail: Class C + 2% $CaCl_2$ + 0.25 pps Celloflake
Inter. Single stage	300	11.8	2.45	14.4	72	Lead: 50:50:10 C: Poz:Gel w/ 5% Salt + 5 pps LCM + 0.25 pps Cello flake
	275	14.8	1.32	6.3	6	Tail: Class C w/ 2% $CaCl_2$
	IF DV Tool +/- ~~907'~~ 1010					
Inter. Multi-Stage	150	11.8	2.45	14.4	72	1st stage Lead: 50:50:10 C: Poz:Gel w/ 5% Salt + 5 pps Lcm + 0.25 pps Cello flake
	225	14.8	1.32	6.3	6	1st stage Tail: Class C w/ 2% CaCl2
	200	11.8	2.45	14.4	72	2nd stage Lead: 50:50:10 C: Poz:Gel w/ 5% Salt + 5 pps LCM + 0.25 pps Cello flake

See COA

Prod. Single Stage	625	12.5	2.01	11.4	22	Lead: 35:65:6 C:Poz Gel w/5% salt + 5 pps LCM + 0.2% SMS + 1% FL-25 + 1% Ba-58+0.3% FL-52A + 0.125 pps CF
	1000	14	1.37	6.4	10	Tail: 50:50:2 C:Pox Gel w/5% salt+3 pps LCM + 0.6% SMS + 1% FL-25 +1% BA-58+ 0.125 pps CF
	IF DV/ECP Tool +/- 3982'					
Prod Multi-Stage	400	12.5	2.01	11.4	22	2nd Stage Lead: 35:65;6 C:Poz Gel w/5% salt+5 pps LCM+0.2% SMS + 1% FL-25+1% BA-58+0.3% FL-52A+ 0.125 pps CF
	150	16.8	.99	4.8	6	2nd Stage Tail: Class"C" w/0.3% R-3 + 1.5% CD-32
	200	12.5	2.01	11.4	22	1st stage Lead: 35:65:6 C: PozGel w/5% salt + 5 pps LCM + 0.2% SMS + 1% FL-25+ 1% BA-58 + 0.3% FL-52A + 0.125 pps CF
	1000	14	1.37	6.4	10	1st stage Tail: 50:50:2 C: PozGel w/5% salt + 3 pps LCM + 0.6% SMS + 1% FL-25 + 1% BA-58 + 0.125 pps CF

See COA
Extremely Low Cement!

Casing String	TOC	% Excess
Surface	0'	50%
Intermediate	0'	50%
Production	0'	35%

4. Pressure Control Equipment * See attachment for further details*****

No	A variance is requested for the use of a diverter on the surface casing. See attached for schematic.

OP installed and tested before drilling which hole?	Size?	Min Required WP	Type	✓	Tested to:
12-1/4"	13-5/8"	2M	Annular	X	2000 psi
			Blind Ram		
			Pipe Ram		
			Double Ram		
			Other*		
8-3/4" & 7 7/8"	13-5/8"	2M	Annular	X	2000 psi
			Blind Ram		
			Pipe Ram		
			Double Ram		
			Other*		

*Specify if additional ram is utilized.

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

NA	Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.
NA	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.
NA	Are anchors required by manufacturer?
NA	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested. • Provide description here See attached schematic.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. shoe	FW Gel	8.6-8.8	28-34	N/C
Surf shoe	Int shoe	Saturated Brine	10.0-10.2	28-34	N/C
Int shoe	TD	FW-Cut Brine	8.5-9.2	28-34	N/C

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

What will be used to monitor the loss or gain of fluid?	PVT/Pason/Visual Monitoring

6. Logging and Testing Procedures

See COA

Logging, Coring and Testing.	
X	Will run Cased hole GR/CNL from KOP to surface. Stated logs run will be in the Completion Report and submitted to the BLM.
No	Open hole logs are planned from KOP to Intermediate casing shoe.
No	Drill stem test? If yes, explain
No	Coring? If yes, explain

Additional logs planned		Interval
	Resistivity	Int. shoe to KOP
	Density	Int. shoe to KOP
	CBL	Production casing
X	Mud log	Intermediate shoe to TD
X	PEX/HRLA/HNGS	Intermediate shoe to KOP

7. Drilling Conditions

See COA

Condition	Specify what type and where?
BH Pressure at deepest TVD	2794 psi
Abnormal Temperature	No

Mitigation measure for abnormal conditions.

Hydrogen Sulfide (H2S) monitors will be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM.

Yes

~~NO~~	H2S is present
Yes	H2S Plan attached

8. Other facets of operation

Is this a walking operation? No.
Will be pre-setting casing? No

Attachments:
Directional Plan
Multi-stage Cement deatils
BOP description

Multi-stage Cement details:

Discussion of DV Tool cement options:

9 5/8" DV tool cement option is proposed for approval. This may become necessary if lost circulation occurs while drilling the 12 ¼" intermediate hole. DV tool depth will be based on hole conditions. Cement volumes will be adjusted proportionally. DV Tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe.

7" DV tool cement option is proposed for approval. This may become necessary if water flows in the San Andres are encountered. These water flows normally occur in areas where produced water disposal is happening. This dense cement is used to combat water flows. This cement recipe also has a right angle set time and is mixed a little under saturated so the water flow will be absorbed by cement. DV tool depth will be based on hole conditions. Cement volumes will be adjusted proportionally. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe.

Discussion of Pressure Control Equipment:

A 13 5/8" 3000 psi Double ram BOP or 13 5/8" 3000 psi Hydril type annular preventor will be used depending on the rig selected.

See COA

The majority of the rigs currently in use by COG have 13 5/8" 3000 psi BOPs (double ram or hydril type) but due to the vagaries of rig scheduling one of the few rigs with 11" BOPs might be used if the intermediate hole size is 11"; therefore, COG Operating LLC requests variance to the requirement of 13 5/8" BOPS on 13 3/8" casing. When the circumstance occurs that a 11" BOP is used on 13 3/8" casing a special flange will be utilized to allow testing the entire BOP with a test plug, without subjecting the casing to test pressure. The special flange also allows return to full-open capability if desired.

In every case COG Operating LLC will use BOP equipment which will meet or exceed well control requirements of Onshore Oil and Gas Order No. 2.

GEG 8/18/15

Wording does not match diagram

COG OPERATING, LLC

Lea County, NM
Ivar The Boneless Fed 24H
24H

Lateral

Plan: Plan #1

Standard Planning Report

06 February, 2015

Section Distances

Sec22,T17S,R32E
SHL - Unit C
120'FNL, 2380'FWL
Sec15,T17S,R32E
PP - Unit N
401'FSL, 2301'FWL
PBHL - Unit C
330'FNL, 2310'FWL

Database:	EDM R5000.1 MULTI	**Local Co-ordinate Reference:**	Well 24H
Company:	COG OPERATING, LLC	**TVD Reference:**	4019' GL + 19' RKB @ 4038.00usft (McVay 6)
Project:	Lea County, NM	**MD Reference:**	4019' GL + 19' RKB @ 4038.00usft (McVay 6)
Site:	Ivar The Boneless Fed 24H	**North Reference:**	Grid
Well:	24H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #1		

Project	Lea County, NM		
Map System:	US State Plane 1927 (Exact solution)	**System Datum:**	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Ivar The Boneless Fed 24H				
Site Position:		**Northing:**	665,024.80 usft	**Latitude:**	32° 49' 36.85 N
From:	Map	**Easting:**	677,779.10 usft	**Longitude:**	103° 45' 16.53 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13.200 in	**Grid Convergence:**	0.31 °

Well	24H					
Well Position	**+N/-S**	0.00 usft	**Northing:**	665,024.80 usft	**Latitude:**	32° 49' 36.85 N
	+E/-W	0.00 usft	**Easting:**	677,779.10 usft	**Longitude:**	103° 45' 16.53 W
Position Uncertainty		0.00 usft	**Wellhead Elevation:**	0.00 usft	**Ground Level:**	4,019.00 usft

Wellbore	Lateral			
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	HDGM	1/23/2015	7.37	60.90	48,661

Design	Plan #1			
Audit Notes:				
Version:	**Phase:**	PROTOTYPE	**Tie On Depth:**	0.00

Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**
	0.00	0.00	0.00	358.86

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,829.21	0.00	0.00	5,829.21	0.00	0.00	0.00	0.00	0.00	0.00	
6,656.48	91.00	351.00	6,350.00	523.44	-82.90	11.00	11.00	0.00	351.00	
6,959.00	91.00	0.08	6,344.72	824.68	-106.41	3.00	0.00	3.00	89.93	
11,208.37	91.00	0.08	6,270.68	5,073.40	-100.70	0.00	0.00	0.00	0.00	Ivar The Boneless Fe

Database:	EDM R5000.1 MULTI	**Local Co-ordinate Reference:**	Well 24H
Company:	COG OPERATING, LLC	**TVD Reference:**	4019' GL + 19' RKB @ 4038.00usft (McVay 6)
Project:	Lea County, NM	**MD Reference:**	4019' GL + 19' RKB @ 4038.00usft (McVay 6)
Site:	Ivar The Boneless Fed 24H	**North Reference:**	Grid
Well:	24H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00

Database:	EDM R5000.1 MULTI	**Local Co-ordinate Reference:**	Well 24H
Company:	COG OPERATING, LLC	**TVD Reference:**	4019' GL + 19' RKB @ 4038.00usft (McVay 6)
Project:	Lea County, NM	**MD Reference:**	4019' GL + 19' RKB @ 4038.00usft (McVay 6)
Site:	Ivar The Boneless Fed 24H	**North Reference:**	Grid
Well:	24H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00
5,829.21	0.00	0.00	5,829.21	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 11.00									
5,850.00	2.29	351.00	5,849.99	0.41	-0.06	0.41	11.00	11.00	0.00
5,900.00	7.79	351.00	5,899.78	4.74	-0.75	4.76	11.00	11.00	0.00
5,950.00	13.29	351.00	5,948.92	13.77	-2.18	13.81	11.00	11.00	0.00
6,000.00	18.79	351.00	5,996.96	27.41	-4.34	27.49	11.00	11.00	0.00
6,050.00	24.29	351.00	6,043.45	45.53	-7.21	45.67	11.00	11.00	0.00
6,100.00	29.79	351.00	6,087.97	67.97	-10.77	68.17	11.00	11.00	0.00
6,150.00	35.29	351.00	6,130.10	94.52	-14.97	94.80	11.00	11.00	0.00
6,200.00	40.79	351.00	6,169.47	124.94	-19.79	125.31	11.00	11.00	0.00
6,250.00	46.29	351.00	6,205.70	158.94	-25.17	159.41	11.00	11.00	0.00
6,300.00	51.79	351.00	6,238.47	196.22	-31.08	196.80	11.00	11.00	0.00
6,350.00	57.29	351.00	6,267.46	236.43	-37.45	237.12	11.00	11.00	0.00
6,400.00	62.79	351.00	6,292.43	279.20	-44.22	280.02	11.00	11.00	0.00
6,450.00	68.29	351.00	6,313.12	324.13	-51.34	325.08	11.00	11.00	0.00
6,500.00	73.79	351.00	6,329.37	370.82	-58.73	371.91	11.00	11.00	0.00
6,550.00	79.29	351.00	6,341.00	418.82	-66.34	420.06	11.00	11.00	0.00
6,600.00	84.79	351.00	6,347.93	467.71	-74.08	469.09	11.00	11.00	0.00
6,650.00	90.29	351.00	6,350.07	517.03	-81.89	518.56	11.00	11.00	0.00
6,656.48	91.00	351.00	6,350.00	523.44	-82.90	524.98	11.00	11.00	0.00
Start DLS 3.00 TFO 89.93									
6,700.00	91.00	352.31	6,349.24	566.49	-89.22	568.14	3.00	0.00	3.00
6,800.00	91.00	355.31	6,347.49	665.87	-100.01	667.73	3.00	0.00	3.00
6,900.00	91.00	358.31	6,345.74	765.69	-105.58	767.64	3.00	0.00	3.00
6,959.00	91.00	0.08	6,344.72	824.68	-106.41	826.63	3.00	0.00	3.00
Start 4249.37 hold at 6959.00 MD									
7,000.00	91.00	0.08	6,344.00	865.67	-106.35	867.61	0.00	0.00	0.00
7,100.00	91.00	0.08	6,342.26	965.65	-106.22	967.57	0.00	0.00	0.00
7,200.00	91.00	0.08	6,340.52	1,065.64	-106.09	1,067.53	0.00	0.00	0.00
7,300.00	91.00	0.08	6,338.77	1,165.62	-105.95	1,167.50	0.00	0.00	0.00
7,400.00	91.00	0.08	6,337.03	1,265.61	-105.82	1,267.46	0.00	0.00	0.00
7,500.00	91.00	0.08	6,335.29	1,365.59	-105.68	1,367.42	0.00	0.00	0.00
7,600.00	91.00	0.08	6,333.55	1,465.58	-105.55	1,467.38	0.00	0.00	0.00
7,700.00	91.00	0.08	6,331.81	1,565.56	-105.41	1,567.35	0.00	0.00	0.00
7,800.00	91.00	0.08	6,330.06	1,665.55	-105.28	1,667.31	0.00	0.00	0.00
7,900.00	91.00	0.08	6,328.32	1,765.53	-105.14	1,767.27	0.00	0.00	0.00
8,000.00	91.00	0.08	6,326.58	1,865.52	-105.01	1,867.23	0.00	0.00	0.00
8,100.00	91.00	0.08	6,324.84	1,965.50	-104.88	1,967.20	0.00	0.00	0.00
8,200.00	91.00	0.08	6,323.09	2,065.49	-104.74	2,067.16	0.00	0.00	0.00
8,300.00	91.00	0.08	6,321.35	2,165.47	-104.61	2,167.12	0.00	0.00	0.00
8,400.00	91.00	0.08	6,319.61	2,265.46	-104.47	2,267.08	0.00	0.00	0.00
8,500.00	91.00	0.08	6,317.87	2,365.44	-104.34	2,367.05	0.00	0.00	0.00
8,600.00	91.00	0.08	6,316.12	2,465.43	-104.20	2,467.01	0.00	0.00	0.00
8,700.00	91.00	0.08	6,314.38	2,565.41	-104.07	2,566.97	0.00	0.00	0.00
8,800.00	91.00	0.08	6,312.64	2,665.39	-103.94	2,666.93	0.00	0.00	0.00
8,900.00	91.00	0.08	6,310.90	2,765.38	-103.80	2,766.89	0.00	0.00	0.00
9,000.00	91.00	0.08	6,309.16	2,865.36	-103.67	2,866.86	0.00	0.00	0.00
9,100.00	91.00	0.08	6,307.41	2,965.35	-103.53	2,966.82	0.00	0.00	0.00

Database:	EDM R5000.1 MULTI	**Local Co-ordinate Reference:**	Well 24H
Company:	COG OPERATING, LLC	**TVD Reference:**	4019' GL + 19' RKB @ 4038.00usft (McVay 6)
Project:	Lea County, NM	**MD Reference:**	4019' GL + 19' RKB @ 4038.00usft (McVay 6)
Site:	Ivar The Boneless Fed 24H	**North Reference:**	Grid
Well:	24H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,200.00	91.00	0.08	6,305.67	3,065.33	-103.40	3,066.78	0.00	0.00	0.00
9,300.00	91.00	0.08	6,303.93	3,165.32	-103.26	3,166.74	0.00	0.00	0.00
9,400.00	91.00	0.08	6,302.19	3,265.30	-103.13	3,266.71	0.00	0.00	0.00
9,500.00	91.00	0.08	6,300.44	3,365.29	-103.00	3,366.67	0.00	0.00	0.00
9,600.00	91.00	0.08	6,298.70	3,465.27	-102.86	3,466.63	0.00	0.00	0.00
9,700.00	91.00	0.08	6,296.96	3,565.26	-102.73	3,566.59	0.00	0.00	0.00
9,800.00	91.00	0.08	6,295.22	3,665.24	-102.59	3,666.56	0.00	0.00	0.00
9,900.00	91.00	0.08	6,293.48	3,765.23	-102.46	3,766.52	0.00	0.00	0.00
10,000.00	91.00	0.08	6,291.73	3,865.21	-102.32	3,866.48	0.00	0.00	0.00
10,100.00	91.00	0.08	6,289.99	3,965.20	-102.19	3,966.44	0.00	0.00	0.00
10,200.00	91.00	0.08	6,288.25	4,065.18	-102.05	4,066.41	0.00	0.00	0.00
10,300.00	91.00	0.08	6,286.51	4,165.17	-101.92	4,166.37	0.00	0.00	0.00
10,400.00	91.00	0.08	6,284.76	4,265.15	-101.79	4,266.33	0.00	0.00	0.00
10,500.00	91.00	0.08	6,283.02	4,365.14	-101.65	4,366.29	0.00	0.00	0.00
10,600.00	91.00	0.08	6,281.28	4,465.12	-101.52	4,466.26	0.00	0.00	0.00
10,700.00	91.00	0.08	6,279.54	4,565.10	-101.38	4,566.22	0.00	0.00	0.00
10,800.00	91.00	0.08	6,277.80	4,665.09	-101.25	4,666.18	0.00	0.00	0.00
10,900.00	91.00	0.08	6,276.05	4,765.07	-101.11	4,766.14	0.00	0.00	0.00
11,000.00	91.00	0.08	6,274.31	4,865.06	-100.98	4,866.10	0.00	0.00	0.00
11,100.00	91.00	0.08	6,272.57	4,965.04	-100.85	4,966.07	0.00	0.00	0.00
11,208.36	91.00	0.08	6,270.68	5,073.39	-100.70	5,074.39	0.00	0.00	0.00
TD at 11208.37									
11,208.37	91.00	0.08	6,270.68	5,073.40	-100.70	5,074.40	0.00	0.00	0.00

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Ivar The Boneless Fede - plan hits target center - Point	0.00	0.00	0.00	0.00	0.00	665,024.80	677,779.10	32° 49' 36.85 N	103° 45' 16.53 W
Ivar The Boneless Fede - plan hits target center - Point	0.00	0.00	6,270.68	5,073.40	-100.70	670,098.20	677,678.40	32° 50' 27.05 N	103° 45' 17.39 W
Ivar The Boneless Fede - plan hits target center - Point	0.00	0.00	6,350.04	520.98	-82.52	665,545.79	677,696.58	32° 49' 42.01 N	103° 45' 17.47 W

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
5,829.21	5,829.21	0.00	0.00	Start Build 11.00
6,656.48	6,350.00	523.44	-82.90	Start DLS 3.00 TFO 89.93
6,959.00	6,344.72	824.68	-106.41	Start 4249.37 hold at 6959.00 MD
11,208.36	6,270.68	5,073.39	-100.70	TD at 11208.37

COG OPERATING, LLC

Field: Lea County, NM
Site: Ivar The Boneless Fed 24H
Well: 24H
Wellbore: Lateral
Plan: Plan #1

Section Distances

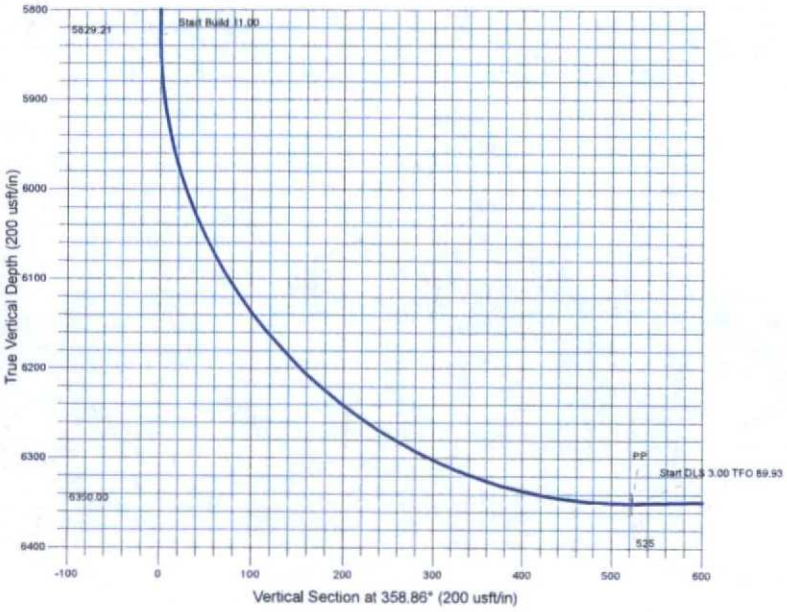
Sec22,T17S,R32E
SHL - Unit C
120'FNL, 2380'FWL
Sec15,T17S,R32E
PP - Unit N
401'FSL, 2301'FWL
PBHL - Unit C
330'FNL, 2310'FWL

TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Ivar The Boneless Federal #24H SHL	0.00	0.00	0.00	665024.80	677779.10	32° 49' 36.85 N	103° 45' 16.53 W
Ivar The Boneless Federal #24H PBHL	6270.68	5073.40	-100.70	670098.20	677678.40	32° 50' 27.05 N	103° 45' 17.39 W
Ivar The Boneless Federal #24H PP	6350.04	520.98	-82.52	665545.78	677696.58	32° 49' 42.01 N	103° 45' 17.47 W

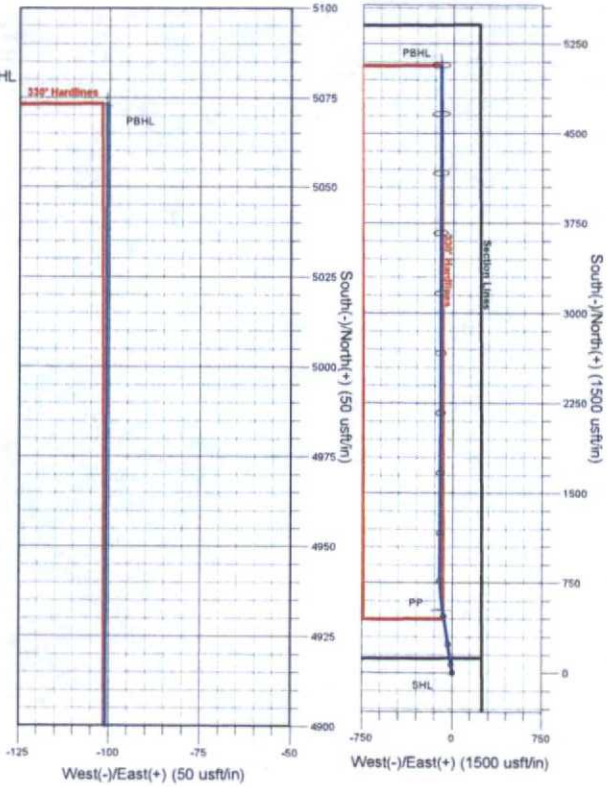
SECTION DETAILS

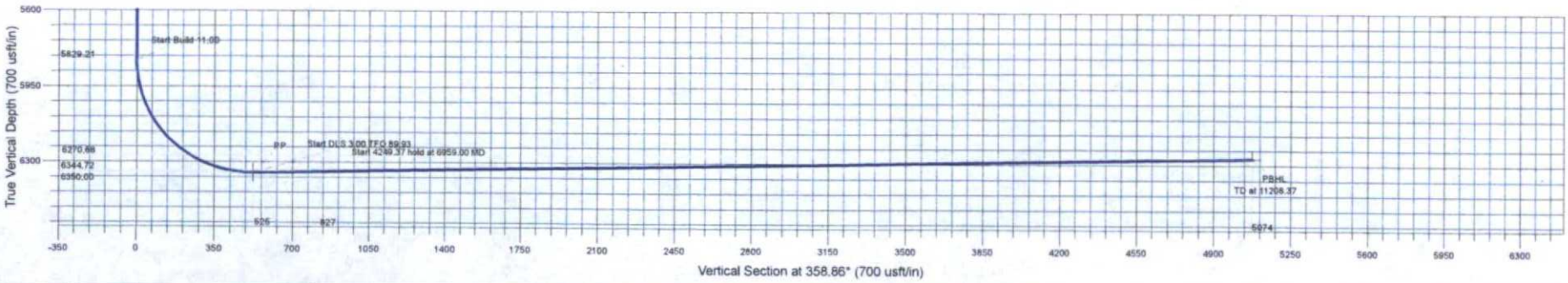
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	5829.21	0.00	0.00	5829.21	0.00	0.00	0.00	0.00	0.00	
3	6656.48	91.00	351.00	6350.00	523.44	-82.90	11.00	351.00	524.98	
4	6959.00	91.00	0.08	6344.72	824.68	-106.41	3.00	89.93	826.63	
5	11208.37	91.00	0.08	6270.68	5073.40	-100.70	0.00	0.00	5074.40	Ivar The Boneless Federal #24H PBHL



Azimuths to Grid North
True North: -0.31°
Magnetic North: 7.05°

Magnetic Field
Strength: 48660.8snT
Dip Angle: 60.90°
Date: 1/23/2015
Model: HDGM





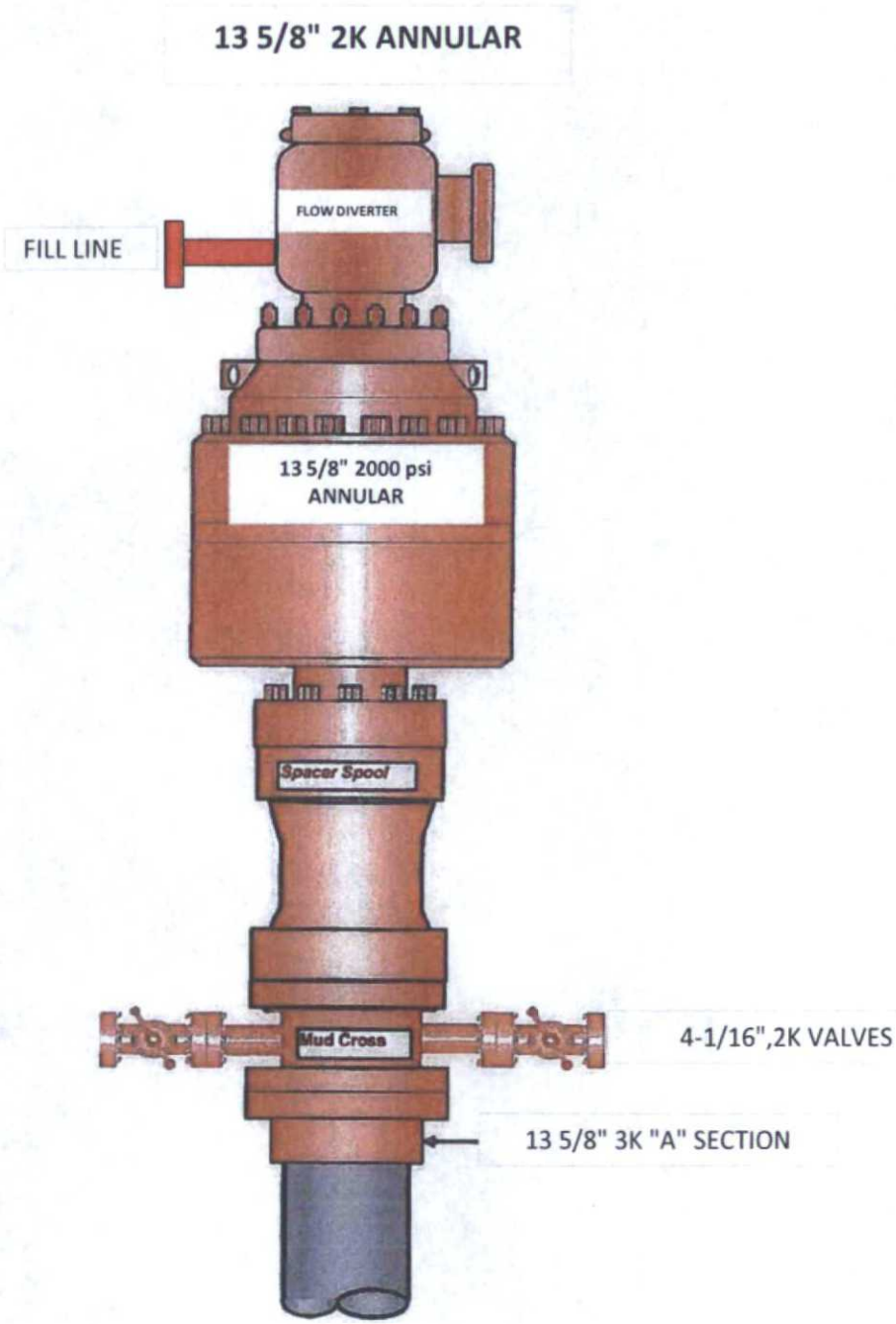
Archer

ARCHER DIRECTIONAL DRILLING SERVICES
12101 Cutten Rd. Houston, Texas 77066
Phone: 281-301-2600 Fax: 281-301-2795

Design: Plan #1 (24H/Lateral)
Created By: Keith Noack
Date: 18:54, February 06 2015

Exhibit #10

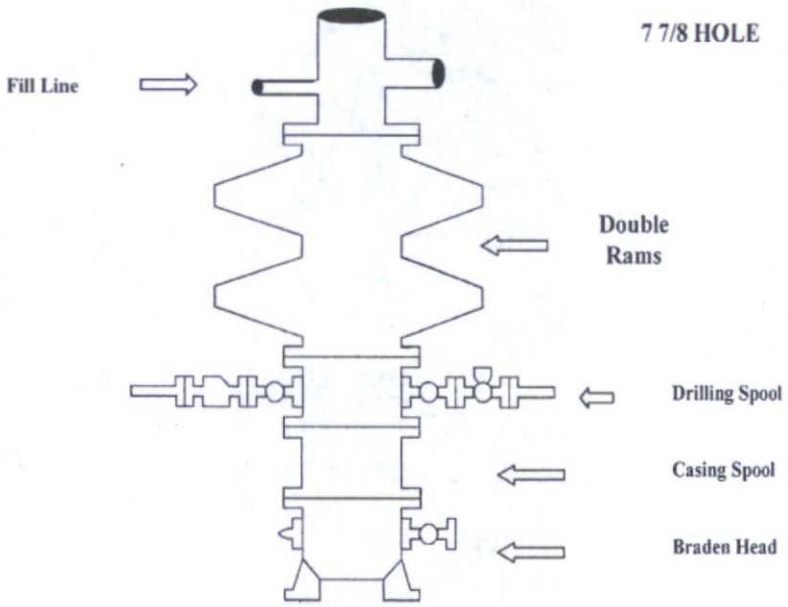
(Choke Manifold Schematic same as Exhibit #9)



COG Operating LLC

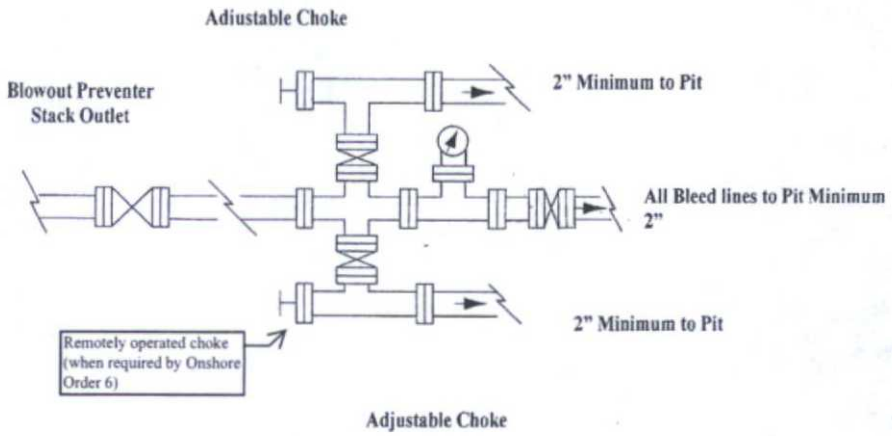
Exhibit #9

BOPE and Choke Schematic



Minimum 4" Nominal choke and kill lines

Choke Manifold Requirement (2000 psi WP)
No Annular Required



NOTES REGARDING THE BLOWOUT PREVENTERS
Master Drilling Plan
Eddy County, New Mexico

1. Drilling nipple to be so constructed that it can be removed without use of a welder through rotary table opening, with minimum I.D. equal to preventer bore.
2. Wear ring to be properly installed in head.
3. Blow out preventer and all fittings must be in good condition, 2000 psi WP minimum.
4. All fittings to be flanged.
5. Safety valve must be available on rig floor at all times with proper connections, valve to be full 2000 psi WP minimum.
6. All choke and fill lines to be securely anchored especially ends of choke lines.
7. Equipment through which bit must pass shall be at least as large as the diameter of the casing being drilled through.
8. Kelly cock on Kelly.
9. Extension wrenches and hands wheels to be properly installed.
10. Blow out preventer control to be located as close to driller's position as feasible.
11. Blow out preventer closing equipment to include minimum 40-gallon accumulator, two independent sources of pump power on each closing unit installation all API specifications.

Closed Loop Operation & Maintenance Procedure

All drilling fluid circulated over shaker(s) with cuttings discharged into roll off container.

Fluid and fines below shaker(s) are circulated with transfer pump through centrifuge(s) or solids separator with cuttings and fines discharged into roll off container.

Fluid is continuously re-circulated through equipment with polymer added to aid separation of cutting fines.

Roll off containers are lined and de-watered with fluids re-circulated into system.

Additional tank is used to capture unused drilling fluid or cement returns from casing jobs.

This equipment will be maintained 24 hrs./day by solids control personnel and or rig crews that stay on location.

Cuttings will be hauled to either:

CRI (permit number R9166)
or
GMI (permit number 711-019-001)

dependent upon which rig is available to drill this well.

COG Operating LLC

Closed Loop Equipment Diagram