

OPERATOR'S COPY

FORM APPROVED
OMB No. 1004-013
Expires July 31, 2010

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

a. Type of Work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NMNM102912
b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		6. If Indian, Allottee or Tribe Name
Name of Operator COG Operating LLC.		7. If Unit or CA Agreement, Name and No.
a. Address 2208 West Main Street Artesia, NM 88210	3b. Phone No. (include area code) 575-748-6940	8. Lease Name and Well No. Almost Heroes 1 Federal #4H
Location of Well (Report location clearly and in accordance with any State requirements *) At surface 375' FSL & 375' FWL Unit Letter M (SWSW) SHL At proposed prod. Zone 330' FNL & 375' FWL Unit Letter D (NWNW) BHL		9. API Well No. 30-015-39292
4. Distance in miles and direction from nearest town or post office* About 7 miles from Malaga		10. Field and Pool, or Exploratory Wildcat; Bone Springs
5. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any) 375'		11. Sec., T.R.M. or Blk and Survey or Area Sec. 1 - T24S - R29E
8. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. 3915'		12. County or Parish Eddy County
16. No. of acres in lease 399.16		13. State NM
17. Spacing Unit dedicated to this well 160		
19. Proposed Depth PHTD 10675 TVD 8250 MD.12625		20. BLM/BIA Bond No. on file NMB000740 & NM B000215
1. Elevations (Show whether DF, KDB, RT, GL, etc.) 3096.4		22. Approximate date work will start* 5/20/2011
		23. Estimated duration 30 days

24. Attachments

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

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

5. Signature <i>Mayte Reyes</i>	Name (Printed/Typed) Mayte Reyes	Date 5/9/2011
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Regulatory Analyst Approved by (Signature) <i>Jesse J. Juen</i>	Name (Printed/Typed) Jesse J. Juen	Date 8/3/11
State Director	Office NM STATE 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)

Carlsbad Controlled Water Basin

Approval Subject to General Requirements
& Special Stipulations Attached

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

STATEMENT ACCEPTING RESPONSIBILITY FOR OPERATIONS

The undersigned accepts all applicable terms, conditions, stipulations, and restrictions concerning operations conducted on the leased land or portion thereof, as described below:

Date: May 9, 2011

Lease #: NMNM102912
Almost Heroes 1 Federal #4H

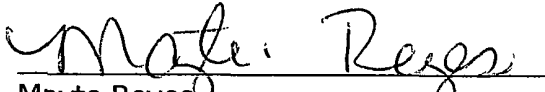
Legal Description: Sec. 1 – T24S – R29E
Eddy County, New Mexico

Formation(s): Bone Springs

Bond Coverage: Statewide

BLM Bond File #: NMB00215

COG OPERATING LLC


Mayte Reyes
Regulatory Analyst

COG Operating LLC
DRILLING AND OPERATIONS PROGRAM

Almost Heroes 1 Federal #4H

SHL: 375' FSL & 375' FWL

BHL: 330' FNL & 375' FWL

Section 1 T24S R29E

Eddy County, New Mexico

In conjunction with Form 3160-3, Application for Permit to Drill subject well, COG Operating LLC submits the following eleven items of pertinent information in accordance with BLM requirements.

1. Geological surface formation: Permian
2. The estimated tops of geologic markers & estimated depths at which anticipated water, oil or gas formations are expected to be encountered are as follows:

Fresh Water	~ 20'	
Top of Salt	684'	
Base of Salt	3100'	
Delaware	3300'	Oil
Bone Spring	7046'	
1 st BSS	8075'	
2 nd BSS	8863'	Oil
3 rd BSS	9988'	
Wolfcamp	10,500'	
Pilot Hole TD	10,675'	
TD TVD	8260'	
TMD	12,625'	

No other formations are expected to give up oil, gas, or fresh water in measurable quantities. The surface fresh water sands will be protected by setting 13-3/8" casing at 600' and circulating cement back to surface. All intervals will be isolated by setting 5 1/2" casing to total depth and tying back cement to 500' inside 9-5/8" shoe.

3. Proposed Casing Program: All casing is new and API approved

hole size	Depths	Section	OD Casing	New/Used	Wt	Collar	Grade	Collapse Design Factor	Burst Design Factor	Tension Design Factor
1 1/2"	0' - 600' 375'	Surface	13 3/8"	New	48#	STC	J-55	1.125	1.125	1.6
1 1/4"	0' - 3200'	Intrmd	9 5/8"	New	36#	STC	J-55	1.125	1.125	1.6
3/4"	3200' - 10,675'	Pilot Hole								
7/8"	0' - 12,625'	Production Curve & Lateral	5 1/2"	New	17#	LTC	P-110	1.125	1.125	1.6

- While running all casing strings, the pipe will be kept a minimum of 1/3 full at all times to avoid approaching the collapse pressure of casing.

4. Proposed Cement Program

- a. 13-3/8" Surface Tail: 550 sx Class C + 2% CaCl₂
(14.8 ppg / 1.35 cuft/sx)
**Calculated w/50% excess on OH volumes
- b. 9 5/8" Intermediate Lead: 700 sx Class C + 4% Gel
(13.5 ppg / 1.75 cuft/sx)
Tail: 250 sx Class C
(14.8 ppg / 1.35 cuft/sx)
**Calculated w/35% excess on OH volumes
- d. 5 1/2" Production 1st Stage:
Lead: 500 sx Class H + Acid soluble
(15.0 ppg / 2.6 cuft/sx)
2nd Stage:
Lead: 800 sx 35:65:6 Class H + Salt + HALAD-322
(12.7 ppg / 1.89 cuft/sx)
Tail: 100 sx Class H
(15.6 ppg / 1.19 cuft/sx)
DVT @ 7600' (approx depth)
**Calculated w/35% excess on OH volumes

- The above cement volumes could be revised pending the caliper measurement from the open hole logs.
- The 9-5/8" intermediate string TOC is designed to circulate cement to surface.
- The production string TOC is designed to reach 500' inside 9-5/8" csg shoe.
- After logging the PH, will plug back to kick off point by setting the following plugs:

PH TD Plug f/PH TD – 10,450' (or 50' above top of Wlfcmp)

100 sx Class H + HR-800 @ 15.6 ppg/1.18 ft³/sx

Kick Off Plug f/7750' – 8250'

250 sx Class H + CFR3 + HR-800 @ 17.2 ppg / 0.98 ft³/sx

5. Minimum Specifications for Pressure Control:

Nipple up on 13 3/8 with 2M system (Hydril) tested to 2000# by independent tester,
Nipple up on 9 5/8 with 3m system tested to 3000# by independent tester

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. A 2" kill line and a 3" choke line will be included in the drilling spool located below the ram-type BOP. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold with 3000 psi WP rating.

6. Estimated BHP:

a. PH TD = 4665 psi

b. Lateral TD = 3600 psi

7. Mud Program: The applicable depths and properties of this system are as follows:

Depth	Type System	Mud Weight	Viscosity (sec)	Waterloss (cc)
0' - 600' <i>400</i>	Fresh Water	8.4	29	N.C.
600' - 3200'	Brine	10	29	N.C.
3200' - 10675' (PH)	Cut Brine	8.9 - 9.2	29	N.C.
3200' - 12,625' (Lateral)	Cut Brine	8.9 - 9.2	29	N.C.

The necessary mud products for weight addition and fluid loss control will be on location at all times.

8. Auxiliary Well Control and Monitoring Equipment:

- A Kelly cock will be in the drill string at all times.
- A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor at all times.
- Hydrogen Sulfide detection equipment will be in operation after drilling out the 13 3/8" casing shoe until the 5 1/2" casing is cemented. Breathing equipment will be on location upon drilling the 13 3/8" shoe until total depth is reached.

9. Testing, Logging and Coring Program: *See COA*

- Drill stem tests will be based on geological sample shows.
- The open hole electrical logging program will be:
 - Total Depth to Intermediate Casing: Dual Laterolog-Micro Laterolog and Gamma Ray. Compensated Neutron - Z Density log with Gamma Ray and Caliper.
 - Total Depth to Surface: Compensated Neutron with Gamma Ray *and N. Density*
 - No coring program is planned
 - Additional testing will be initiated subsequent to setting the 5 1/2" production casing. Specific intervals will be targeted based on log evaluation, geological sample shows and drill stem tests.

10. Potential Hazards:

- No abnormal pressures or temperatures are expected. There is no known presence of H2S in this area. If H2S is encountered the operator will comply with the provisions of Onshore Oil and Gas Order No. 6. No lost circulation is expected to occur. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. No H2S is anticipated to be encountered.

11. Anticipated starting date and Duration of Operations:

- Road and location construction will begin after the BLM has approved the APD. Anticipated spud date will be as possible after BLM approval and as soon as a rig will be available. Move in operations and drilling is expected to take 30 days.



Cog Operating LLC- Eastern NM

Eddy County

Almost Heroes 1 Federal

#4H

OH

Plan: Design #1

Pathfinder X&Y Report

04 May, 2011



A Schlumberger Company



Pathfinder
Pathfinder X&Y Report



Company: Cog Operating LLC- Eastern NM
Project: Eddy County
Site: Almost Heroes 1 Federal
Well: #4H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #4H
TVD Reference: KB = 17' @ 3113.40usft (Original Well Elev)
MD Reference: KB = 17' @ 3113.40usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Project	Eddy County		
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	Almost Heroes 1 Federal		
Site Position:		Northing:	451,433.560 usft
From:	Map	Easting:	661,272.320 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 14' 24.113 N
		Longitude:	103° 48' 42.231 W
		Grid Convergence:	0 28 °

Well	#4H					
Well Position	+N/-S	0.00 usft	Northing:	451,433.560 usft	Latitude:	32° 14' 24.113 N
	+E/-W	0.00 usft	Easting:	661,272.320 usft	Longitude:	103° 48' 42.231 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,096.40 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	5/4/2011	7.70	60.19	48,650

Design	Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	359.42

Survey Tool Program	Date	5/4/2011		
From	To			
(usft)	(usft)	Survey (Wellbore)	Tool Name	Description
0.00	12,624.21	Design #1 (OH)	MWD	MWD - Standard



Pathfinder
Pathfinder X&Y Report



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Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	-3,113.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
100.00	0.00	0.00	100.00	-3,013.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
200.00	0.00	0.00	200.00	-2,913.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
300.00	0.00	0.00	300.00	-2,813.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
400.00	0.00	0.00	400.00	-2,713.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
500.00	0.00	0.00	500.00	-2,613.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
600.00	0.00	0.00	600.00	-2,513.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
700.00	0.00	0.00	700.00	-2,413.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
800.00	0.00	0.00	800.00	-2,313.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
900.00	0.00	0.00	900.00	-2,213.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
1,000.00	0.00	0.00	1,000.00	-2,113.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
1,100.00	0.00	0.00	1,100.00	-2,013.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
1,200.00	0.00	0.00	1,200.00	-1,913.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
1,300.00	0.00	0.00	1,300.00	-1,813.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
1,400.00	0.00	0.00	1,400.00	-1,713.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
1,500.00	0.00	0.00	1,500.00	-1,613.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
1,600.00	0.00	0.00	1,600.00	-1,513.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
1,700.00	0.00	0.00	1,700.00	-1,413.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
1,800.00	0.00	0.00	1,800.00	-1,313.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
1,900.00	0.00	0.00	1,900.00	-1,213.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
2,000.00	0.00	0.00	2,000.00	-1,113.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
2,100.00	0.00	0.00	2,100.00	-1,013.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
2,200.00	0.00	0.00	2,200.00	-913.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
2,300.00	0.00	0.00	2,300.00	-813.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
2,400.00	0.00	0.00	2,400.00	-713.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
2,500.00	0.00	0.00	2,500.00	-613.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
2,600.00	0.00	0.00	2,600.00	-513.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32



Pathfinder
Pathfinder X&Y Report



Company: Cog Operating LLC- Eastern NM
Project: Eddy County
Site: Almost Heroes 1 Federal
Well: #4H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #4H
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

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MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
2,700.00	0.00	0.00	2,700.00	-413.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
2,800.00	0.00	0.00	2,800.00	-313.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
2,900.00	0.00	0.00	2,900.00	-213.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
3,000.00	0.00	0.00	3,000.00	-113.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
3,100.00	0.00	0.00	3,100.00	-13.40	0.00	0.00	0.00	0.00	451,433.56	661,272.32
3,200.00	0.00	0.00	3,200.00	86.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
3,300.00	0.00	0.00	3,300.00	186.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
3,400.00	0.00	0.00	3,400.00	286.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
3,500.00	0.00	0.00	3,500.00	386.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
3,600.00	0.00	0.00	3,600.00	486.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
3,700.00	0.00	0.00	3,700.00	586.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
3,800.00	0.00	0.00	3,800.00	686.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
3,900.00	0.00	0.00	3,900.00	786.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
4,000.00	0.00	0.00	4,000.00	886.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
4,100.00	0.00	0.00	4,100.00	986.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
4,200.00	0.00	0.00	4,200.00	1,086.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
4,300.00	0.00	0.00	4,300.00	1,186.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
4,400.00	0.00	0.00	4,400.00	1,286.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
4,500.00	0.00	0.00	4,500.00	1,386.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
4,600.00	0.00	0.00	4,600.00	1,486.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
4,700.00	0.00	0.00	4,700.00	1,586.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
4,800.00	0.00	0.00	4,800.00	1,686.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
4,900.00	0.00	0.00	4,900.00	1,786.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
5,000.00	0.00	0.00	5,000.00	1,886.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
5,100.00	0.00	0.00	5,100.00	1,986.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
5,200.00	0.00	0.00	5,200.00	2,086.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
5,300.00	0.00	0.00	5,300.00	2,186.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32



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Survey Calculation Method:
Database:

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KB = 17' @ 3113.40usft (Original Well Elev)
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Minimum Curvature
EDM 5000.1 Single User Db

Planned Survey

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5,400.00	0.00	0.00	5,400.00	2,286.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
5,500.00	0.00	0.00	5,500.00	2,386.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
5,600.00	0.00	0.00	5,600.00	2,486.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
5,700.00	0.00	0.00	5,700.00	2,586.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
5,800.00	0.00	0.00	5,800.00	2,686.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
5,900.00	0.00	0.00	5,900.00	2,786.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
6,000.00	0.00	0.00	6,000.00	2,886.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
6,100.00	0.00	0.00	6,100.00	2,986.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
6,200.00	0.00	0.00	6,200.00	3,086.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
6,300.00	0.00	0.00	6,300.00	3,186.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
6,400.00	0.00	0.00	6,400.00	3,286.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
6,500.00	0.00	0.00	6,500.00	3,386.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
6,600.00	0.00	0.00	6,600.00	3,486.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
6,700.00	0.00	0.00	6,700.00	3,586.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
6,800.00	0.00	0.00	6,800.00	3,686.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
6,900.00	0.00	0.00	6,900.00	3,786.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
7,000.00	0.00	0.00	7,000.00	3,886.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
7,100.00	0.00	0.00	7,100.00	3,986.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
7,200.00	0.00	0.00	7,200.00	4,086.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
7,300.00	0.00	0.00	7,300.00	4,186.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
7,400.00	0.00	0.00	7,400.00	4,286.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
7,500.00	0.00	0.00	7,500.00	4,386.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
7,600.00	0.00	0.00	7,600.00	4,486.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
7,700.00	0.00	0.00	7,700.00	4,586.60	0.00	0.00	0.00	0.00	451,433.56	661,272.32
7,772.54	0.00	0.00	7,772.54	4,659.14	0.00	0.00	0.00	0.00	451,433.56	661,272.32
7,775.00	0.30	359.42	7,775.00	4,661.60	0.01	0.00	0.01	12.00	451,433.57	661,272.32
7,800.00	3.30	359.42	7,799.98	4,686.58	0.79	-0.01	0.79	12.00	451,434.35	661,272.31



Pathfinder
Pathfinder X&Y Report



Company: Cog Operating LLC- Eastern NM
Project: Eddy County
Site: Almost Heroes 1 Federal
Well: #4H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #4H
TVD Reference: KB = 17' @ 3113.40usft (Original Well Elev)
MD Reference: KB = 17' @ 3113.40usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
7,825.00	6.30	359.42	7,824.89	4,711.49	2.88	-0.03	2.88	12.00	451,436.44	661,272.29
7,850.00	9.30	359.42	7,849.66	4,736.26	6.27	-0.06	6.27	12.00	451,439.83	661,272.26
7,875.00	12.30	359.42	7,874.22	4,760.82	10.95	-0.11	10.95	12.00	451,444.51	661,272.21
7,900.00	15.30	359.42	7,898.49	4,785.09	16.91	-0.17	16.91	12.00	451,450.47	661,272.15
7,925.00	18.30	359.42	7,922.42	4,809.02	24.13	-0.25	24.13	12.00	451,457.69	661,272.07
7,950.00	21.30	359.42	7,945.94	4,832.54	32.60	-0.33	32.60	12.00	451,466.16	661,271.99
7,975.00	24.30	359.42	7,968.99	4,855.59	42.28	-0.43	42.29	12.00	451,475.84	661,271.89
8,000.00	27.30	359.42	7,991.49	4,878.09	53.16	-0.54	53.16	12.00	451,486.72	661,271.78
8,025.00	30.30	359.42	8,013.40	4,900.00	65.20	-0.66	65.20	12.00	451,498.76	661,271.66
8,050.00	33.30	359.42	8,034.65	4,921.25	78.37	-0.80	78.37	12.00	451,511.93	661,271.52
8,075.00	36.30	359.42	8,055.17	4,941.77	92.63	-0.94	92.64	12.00	451,526.19	661,271.38
8,100.00	39.30	359.42	8,074.93	4,961.53	107.95	-1.10	107.96	12.00	451,541.51	661,271.22
8,125.00	42.30	359.42	8,093.85	4,980.45	124.28	-1.26	124.29	12.00	451,557.84	661,271.06
8,150.00	45.30	359.42	8,111.89	4,998.49	141.58	-1.44	141.59	12.00	451,575.14	661,270.88
8,175.00	48.30	359.42	8,129.01	5,015.61	159.80	-1.63	159.81	12.00	451,593.36	661,270.69
8,200.00	51.30	359.42	8,145.14	5,031.74	178.89	-1.82	178.90	12.00	451,612.45	661,270.50
8,225.00	54.30	359.42	8,160.26	5,046.86	198.80	-2.02	198.81	12.00	451,632.36	661,270.30
8,250.00	57.30	359.42	8,174.31	5,060.91	219.47	-2.23	219.49	12.00	451,653.03	661,270.09
8,275.00	60.30	359.42	8,187.26	5,073.86	240.85	-2.45	240.87	12.00	451,674.41	661,269.87
8,300.00	63.30	359.42	8,199.08	5,085.68	262.88	-2.68	262.90	12.00	451,696.44	661,269.64
8,325.00	66.30	359.42	8,209.72	5,096.32	285.50	-2.91	285.51	12.00	451,719.06	661,269.41
8,350.00	69.30	359.42	8,219.17	5,105.77	308.64	-3.14	308.66	12.00	451,742.20	661,269.18
8,375.00	72.30	359.42	8,227.39	5,113.99	332.24	-3.38	332.26	12.00	451,765.80	661,268.94
8,400.00	75.30	359.42	8,234.37	5,120.97	356.25	-3.63	356.27	12.00	451,789.81	661,268.69
8,425.00	78.30	359.42	8,240.08	5,126.68	380.58	-3.87	380.60	12.00	451,814.14	661,268.45
8,450.00	81.30	359.42	8,244.51	5,131.11	405.18	-4.12	405.20	12.00	451,838.74	661,268.20
8,475.00	84.30	359.42	8,247.64	5,134.24	429.98	-4.38	430.00	12.00	451,863.54	661,267.94



Pathfinder
Pathfinder X&Y Report



Company: Cog Operating LLC- Eastern NM
Project: Eddy County
Site: Almost Heroes 1 Federal
Well: #4H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #4H
TVD Reference: KB = 17' @ 3113.40usft (Original Well Elev)
MD Reference: KB = 17' @ 3113.40usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
8,500.00	87.30	359.42	8,249.47	5,136.07	454.91	-4.63	454.93	12.00	451,888.47	661,267.69
8,522.54	90.00	359.42	8,250.00	5,136.60	477.44	-4.86	477.47	12.00	451,911.00	661,267.46
8,600.00	90.00	359.42	8,250.00	5,136.60	554.90	-5.65	554.92	0.00	451,988.46	661,266.67
8,700.00	90.00	359.42	8,250.00	5,136.60	654.89	-6.66	654.92	0.00	452,088.45	661,265.66
8,800.00	90.00	359.42	8,250.00	5,136.60	754.89	-7.68	754.92	0.00	452,188.45	661,264.64
8,900.00	90.00	359.42	8,250.00	5,136.60	854.88	-8.70	854.92	0.00	452,288.44	661,263.62
9,000.00	90.00	359.42	8,250.00	5,136.60	954.88	-9.72	954.92	0.00	452,388.44	661,262.60
9,100.00	90.00	359.42	8,250.00	5,136.60	1,054.87	-10.74	1,054.92	0.00	452,488.43	661,261.58
9,200.00	90.00	359.42	8,250.00	5,136.60	1,154.87	-11.75	1,154.92	0.00	452,588.43	661,260.57
9,300.00	90.00	359.42	8,250.00	5,136.60	1,254.86	-12.77	1,254.92	0.00	452,688.42	661,259.55
9,400.00	90.00	359.42	8,250.00	5,136.60	1,354.85	-13.79	1,354.92	0.00	452,788.41	661,258.53
9,500.00	90.00	359.42	8,250.00	5,136.60	1,454.85	-14.81	1,454.92	0.00	452,888.41	661,257.51
9,600.00	90.00	359.42	8,250.00	5,136.60	1,554.84	-15.82	1,554.92	0.00	452,988.40	661,256.50
9,700.00	90.00	359.42	8,250.00	5,136.60	1,654.84	-16.84	1,654.92	0.00	453,088.40	661,255.48
9,800.00	90.00	359.42	8,250.00	5,136.60	1,754.83	-17.86	1,754.92	0.00	453,188.39	661,254.46
9,900.00	90.00	359.42	8,250.00	5,136.60	1,854.83	-18.88	1,854.92	0.00	453,288.39	661,253.44
10,000.00	90.00	359.42	8,250.00	5,136.60	1,954.82	-19.89	1,954.92	0.00	453,388.38	661,252.43
10,100.00	90.00	359.42	8,250.00	5,136.60	2,054.82	-20.91	2,054.92	0.00	453,488.38	661,251.41
10,200.00	90.00	359.42	8,250.00	5,136.60	2,154.81	-21.93	2,154.92	0.00	453,588.37	661,250.39
10,300.00	90.00	359.42	8,250.00	5,136.60	2,254.81	-22.95	2,254.92	0.00	453,688.37	661,249.37
10,400.00	90.00	359.42	8,250.00	5,136.60	2,354.80	-23.97	2,354.92	0.00	453,788.36	661,248.35
10,500.00	90.00	359.42	8,250.00	5,136.60	2,454.80	-24.98	2,454.92	0.00	453,888.36	661,247.34
10,600.00	90.00	359.42	8,250.00	5,136.60	2,554.79	-26.00	2,554.92	0.00	453,988.35	661,246.32
10,700.00	90.00	359.42	8,250.00	5,136.60	2,654.79	-27.02	2,654.92	0.00	454,088.35	661,245.30
10,800.00	90.00	359.42	8,250.00	5,136.60	2,754.78	-28.04	2,754.92	0.00	454,188.34	661,244.28
10,900.00	90.00	359.42	8,250.00	5,136.60	2,854.78	-29.05	2,854.92	0.00	454,288.34	661,243.27
11,000.00	90.00	359.42	8,250.00	5,136.60	2,954.77	-30.07	2,954.92	0.00	454,388.33	661,242.25



Pathfinder
Pathfinder X&Y Report



Company: Cog Operating LLC- Eastern NM
Project: Eddy County
Site: Almost Heroes 1 Federal
Well: #4H
Wellbore: OH
Design: Design #1

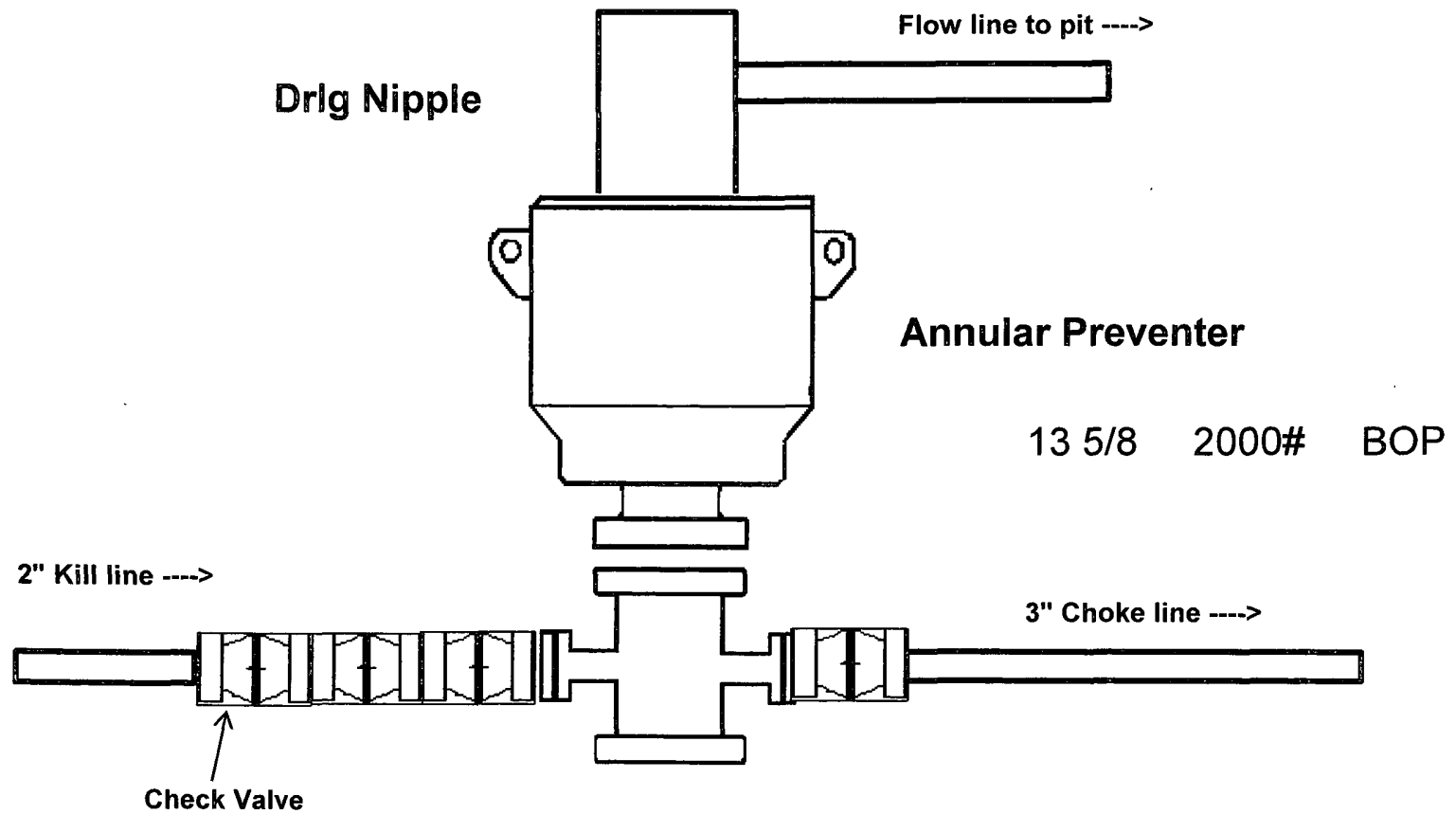
Local Co-ordinate Reference: Well #4H
TVD Reference: KB = 17' @ 3113.40usft (Original Well Elev)
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
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Planned Survey

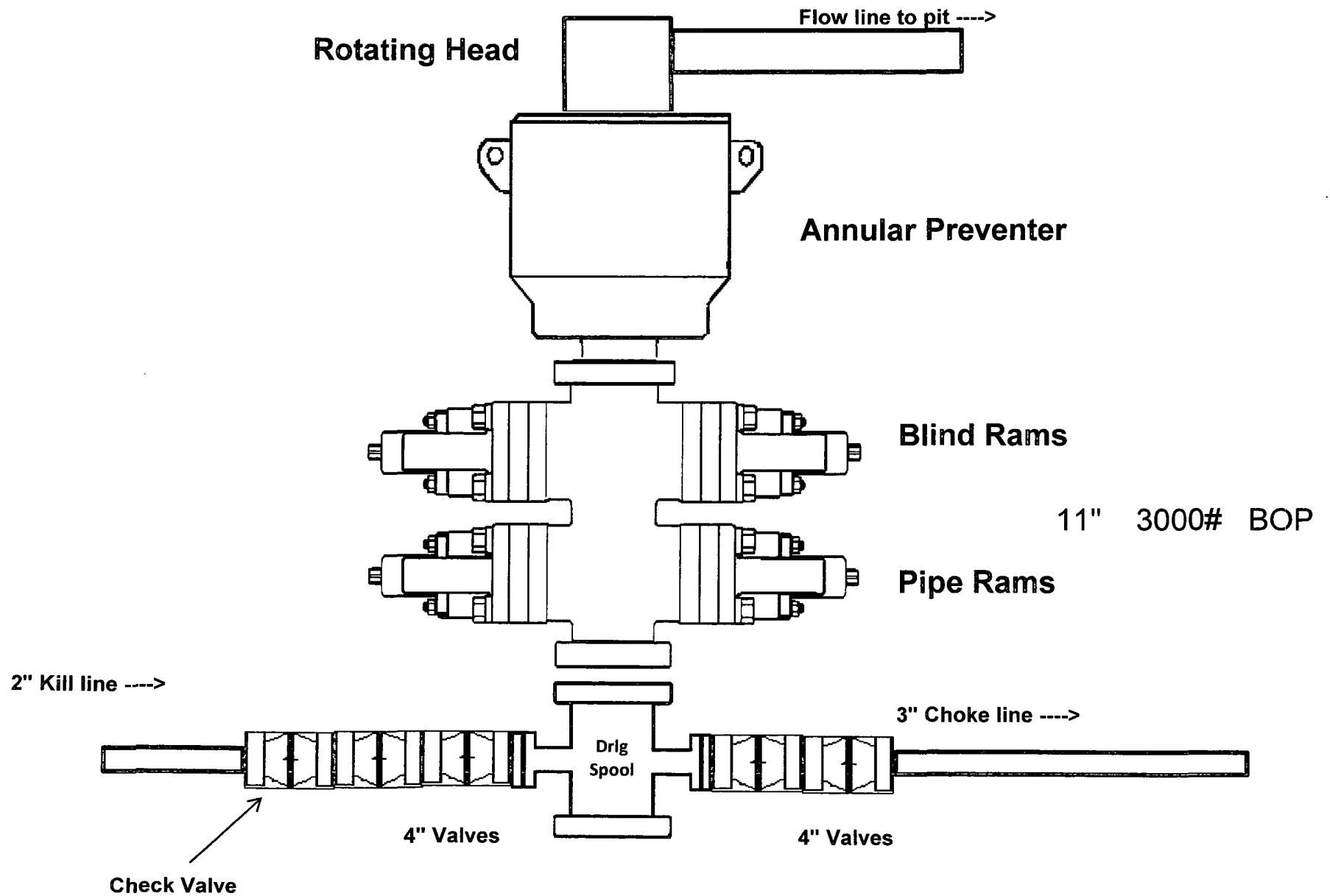
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
11,100.00	90.00	359.42	8,250.00	5,136.60	3,054.77	-31.09	3,054.92	0.00	454,488.33	661,241.23
11,200.00	90.00	359.42	8,250.00	5,136.60	3,154.76	-32.11	3,154.92	0.00	454,588.32	661,240.21
11,300.00	90.00	359.42	8,250.00	5,136.60	3,254.76	-33.12	3,254.92	0.00	454,688.32	661,239.20
11,400.00	90.00	359.42	8,250.00	5,136.60	3,354.75	-34.14	3,354.92	0.00	454,788.31	661,238.18
11,500.00	90.00	359.42	8,250.00	5,136.60	3,454.75	-35.16	3,454.92	0.00	454,888.31	661,237.16
11,600.00	90.00	359.42	8,250.00	5,136.60	3,554.74	-36.18	3,554.92	0.00	454,988.30	661,236.14
11,700.00	90.00	359.42	8,250.00	5,136.60	3,654.74	-37.19	3,654.92	0.00	455,088.30	661,235.13
11,800.00	90.00	359.42	8,250.00	5,136.60	3,754.73	-38.21	3,754.92	0.00	455,188.29	661,234.11
11,900.00	90.00	359.42	8,250.00	5,136.60	3,854.73	-39.23	3,854.92	0.00	455,288.29	661,233.09
12,000.00	90.00	359.42	8,250.00	5,136.60	3,954.72	-40.25	3,954.92	0.00	455,388.28	661,232.07
12,100.00	90.00	359.42	8,250.00	5,136.60	4,054.71	-41.27	4,054.92	0.00	455,488.27	661,231.05
12,200.00	90.00	359.42	8,250.00	5,136.60	4,154.71	-42.28	4,154.92	0.00	455,588.27	661,230.04
12,300.00	90.00	359.42	8,250.00	5,136.60	4,254.70	-43.30	4,254.92	0.00	455,688.26	661,229.02
12,400.00	90.00	359.42	8,250.00	5,136.60	4,354.70	-44.32	4,354.92	0.00	455,788.26	661,228.00
12,500.00	90.00	359.42	8,250.00	5,136.60	4,454.69	-45.34	4,454.92	0.00	455,888.25	661,226.98
12,600.00	90.00	359.42	8,250.00	5,136.60	4,554.69	-46.35	4,554.92	0.00	455,988.25	661,225.97
12,624.21	90.00	359.42	8,250.00	5,136.60	4,578.90	-46.60	4,579.14	0.00	456,012.46	661,225.72

Checked By: _____ Approved By: _____ Date: _____

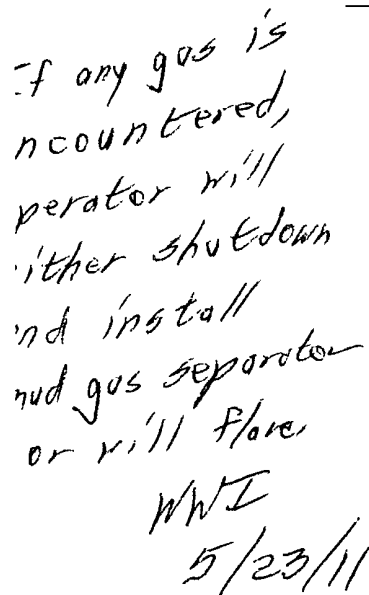
2,000 psi BOP Schematic



3,000 psi BOP Schematic



1



3M Choke Manifold Equipment

