

OCD-HOBBS

HOBBS OCD

MAY 25 2012

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

1a. Type of Work: ☒ DRILL ☐ REENTER		RECEIVED	5. Lease Serial No. NMNM120910
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone			6. If Indian, Allottee or Tribe Name
2. Name of Operator COG Production LLC.			7. If Unit or CA Agreement, Name and No.
3a. Address 2208 West Main Street Artesia, NM 88210		3b. Phone No. (include area code) 575-748-6940	8. Lease Name and Well No. <u><390477></u> Bufflehead 10 Federal #2H
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 330' FNL & 480' FEL Unit Letter A NENE Section 10-T26S-R32E At proposed prod. Zone 330' FSL & 330' FEL Unit Letter P SESE Section 10-T26S-R32E			9. API Well No. 30-025-40594
14. Distance in miles and direction from nearest town or post office* About 24 miles from Jal New Mexico			10. Field and Pool, or Exploratory WC 025 G05 5243208A BS: Upper Lower Avalon Shale <u><97838></u>
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any) 1650'		16. No. of acres in lease 1418.62	11. Sec., T.R.M. or Blk and Survey or Area Section 10-T26S-R32E
18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. 1170'		17. Spacing Unit dedicated to this well 160	12. County or Parish Lea
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3243'		22. Approximate date work will start* 4/30/2012	13. State New Mexico
		20. BLM/BIA Bond No. on file NMB0008451, NMB000860 NMB0006970	
		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:

- | | |
|---|--|
| 1. 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). |
| 2. A Drilling Plan | 5. Operator certification |
| 3. 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. |

25. Signature <i>Mayte Reyes</i>	Name (Printed/Typed) Mayte Reyes	Date 3/13/2012
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Regulatory Analyst	
Approved by (Signature) /s/ Don Peterson	Name (Printed/Typed) CARLSBAD FIELD OFFICE
Title FOR FIELD MANAGER	Date MAY 23 2012

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)

Carlsbad Controlled Water Basin

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

Approval Subject to General Requirements
& Special Stipulations Attached

MAY 31 2012

COG Operating LLC
DRILLING AND OPERATIONS PROGRAM
Bufflehead 10 Federal #2H
SHL: 330' FNL & 480' FEL
BHL: 330' FSL & 330' FEL
Section 10 T26S R32E
Lea 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	~ 150'	
Rustler	810'	
Top of Salt	1250'	
Base of Salt	4344'	
Delaware	4561'	Oil
Bone Spring	8720'	Oil
1 st BSS	9671'	
TD TVD	9530'	
TD MD	14,016'	

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 835' 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 a minimum of 500' into 9-5/8" csg.

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
17 1/2"	0' - 835'	Surface	13 3/8"	New	54.5#	STC	J-55	1.125	1.125	1.6
12 1/4"	0' - 3500'	Intrmd	9 5/8"	New	36#	BTC	J-55	1.125	1.125	1.6
12 1/4"	3500' - 4450'	Intrmd	9 5/8"	New	40#	BTC	J-55	1.125	1.125	1.6
7 7/8"	0' - 14,016'	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.

See
COA

- The above cement volumes could be revised pending the caliper measurement from the open hole logs.
- The 9-5/8" intermediate string is designed to circulate to surface.
- The production string will at least tie back 500' into 9-5/8" shoe (above slurry volumes are design to circulate to surface).

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 minimum 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.

Lateral TD = 4150 psi

Depth	Type System	Mud Weight	Viscosity (sec)	Waterloss (cc)
0' - 835' 950'	Fresh Water	8.4	29	N.C.
835' - 4450'	Brine	10	29	N.C.
4450' - 14,016' (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. A Kelly cock will be in the drill string at all times.
- b. A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor at all times.
- c. 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 Con*

- a. Drill stem tests will be based on geological sample shows.
- b. If open hole electrical logging is preformed, the program will be:
 - i. Total Depth to Intermediate Casing: Dual Laterolog-Micro Laterolog and Gamma Ray. Compensated Neutron – Z Density log with Gamma Ray and Caliper.
 - ii. Total Depth to Surface: Compensated Neutron with Gamma Ray
 - iii. No coring program is planned
 - iv. 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:

- a. 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. 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:

- a. 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

Lea County(NAD27)

Bufflehead 10 Fed

#2H

OH

Plan: Plan #1

Pathfinder X & Y Report

28 February, 2012



A Schlumberger Company



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Lea County(NAD27)	TVD Reference:	KB = 18' @ 3261.0usft (Original Well Elev)
Site:	Bufflehead 10 Fed	MD Reference:	KB = 18' @ 3261.0usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000 1 Single User Db

Project:	Lea County(NAD27)	System Datum:	Mean Sea Level
Map System:	US State Plane 1927 (Exact solution)		
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site:	Bufflehead 10 Fed		
Site Position:		Northing:	387,647 700 usft
From:	Map	Easting:	708,869.000 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 3' 50 275 N
		Longitude:	103° 39' 32 721 W
		Grid Convergence:	0 36 °

Well:	#2H			
Well Position	+N/-S	0 0 usft	Northing:	387,657 400 usft
	+E/-W	0.0 usft	Easting:	710,038.800 usft
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft
			Latitude:	32° 3' 50.299 N
			Longitude:	103° 39' 19 127 W
			Ground Level:	3,243 0 usft

Wellbore:	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF200510	2/28/2012	7.52	60.03	48,481

Design:	Plan #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0 0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0 0	0 0	0 0	177 47

Survey Tool Program	Date	2/28/2012		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
0.0	14,016 1	Plan #1 (OH)		



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Bufflehead 10 Fed
Well: #2H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:
Well #2H
KB = 18' @ 3261 0usft (Original Well Elev)
KB = 18' @ 3261 0usft (Original Well Elev)
Grid
Minimum Curvature
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)		
0 0	0 00	0 00	0 0	-3,261 0	0 0	0 0	0 0	0 00	387,657 40	710,038 80		
100.0	0.00	0.00	100.0	-3,161 0	0 0	0 0	0 0	0 00	387,657 40	710,038 80		
200.0	0.00	0.00	200 0	-3,061 0	0 0	0 0	0 0	0.00	387,657 40	710,038 80		
300 0	0 00	0.00	300 0	-2,961 0	0.0	0.0	0 0	0 00	387,657.40	710,038 80		
400 0	0 00	0 00	400 0	-2,861 0	0 0	0.0	0 0	0 00	387,657 40	710,038 80		
500 0	0.00	0 00	500 0	-2,761 0	0.0	0 0	0.0	0.00	387,657 40	710,038 80		
600 0	0.00	0 00	600.0	-2,661.0	0 0	0.0	0 0	0 00	387,657 40	710,038 80		
700 0	0 00	0 00	700 0	-2,561 0	0 0	0 0	0 0	0.00	387,657 40	710,038 80		
800 0	0.00	0 00	800 0	-2,461 0	0 0	0 0	0 0	0 00	387,657 40	710,038 80		
900 0	0 00	0 00	900 0	-2,361 0	0 0	0.0	0 0	0 00	387,657 40	710,038 80		
1,000.0	0 00	0 00	1,000 0	-2,261.0	0.0	0.0	0 0	0 00	387,657 40	710,038 80		
1,100.0	0 00	0 00	1,100.0	-2,161 0	0 0	0 0	0 0	0 00	387,657 40	710,038 80		
1,200 0	0.00	0 00	1,200 0	-2,061 0	0 0	0.0	0.0	0 00	387,657.40	710,038 80		
1,300.0	0 00	0 00	1,300 0	-1,961.0	0.0	0 0	0 0	0 00	387,657 40	710,038 80		
1,400 0	0 00	0 00	1,400 0	-1,861.0	0 0	0 0	0 0	0 00	387,657 40	710,038 80		
1,500 0	0 00	0 00	1,500.0	-1,761 0	0 0	0.0	0 0	0 00	387,657 40	710,038 80		
1,600 0	0 00	0 00	1,600 0	-1,661 0	0 0	0 0	0.0	0 00	387,657 40	710,038 80		
1,700 0	0 00	0 00	1,700 0	-1,561 0	0 0	0 0	0.0	0 00	387,657 40	710,038 80		
1,800 0	0 00	0 00	1,800 0	-1,461 0	0 0	0.0	0 0	0 00	387,657.40	710,038 80		
1,900.0	0 00	0 00	1,900 0	-1,361 0	0.0	0 0	0 0	0 00	387,657 40	710,038 80		
2,000 0	0 00	0 00	2,000 0	-1,261 0	0 0	0 0	0 0	0 00	387,657 40	710,038 80		
2,100 0	0 00	0 00	2,100 0	-1,161 0	0 0	0 0	0 0	0 00	387,657 40	710,038 80		
2,200.0	0 00	0 00	2,200 0	-1,061 0	0 0	0.0	0 0	0.00	387,657 40	710,038 80		
2,300.0	0 00	0 00	2,300 0	-961.0	0 0	0 0	0 0	0 00	387,657.40	710,038 80		
2,400 0	0 00	0 00	2,400 0	-861 0	0 0	0 0	0 0	0 00	387,657 40	710,038 80		
2,500 0	0 00	0 00	2,500 0	-761 0	0 0	0 0	0 0	0 00	387,657 40	710,038 80		
2,600.0	0 00	0 00	2,600 0	-661 0	0 0	0 0	0 0	0 00	387,657 40	710,038 80		



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Pathfinder X & Y Report

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Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well #2H
KB = 18' @ 3261.0usft (Original Well Elev)
KB = 18' @ 3261.0usft (Original Well Elev)
Grid
Minimum Curvature
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)
2,700.0	0.00	0.00	2,700.0	-561.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
2,800.0	0.00	0.00	2,800.0	-461.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
2,900.0	0.00	0.00	2,900.0	-361.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
3,000.0	0.00	0.00	3,000.0	-261.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
3,100.0	0.00	0.00	3,100.0	-161.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
3,200.0	0.00	0.00	3,200.0	-61.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
3,300.0	0.00	0.00	3,300.0	39.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
3,400.0	0.00	0.00	3,400.0	139.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
3,500.0	0.00	0.00	3,500.0	239.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
3,600.0	0.00	0.00	3,600.0	339.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
3,700.0	0.00	0.00	3,700.0	439.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
3,800.0	0.00	0.00	3,800.0	539.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
3,900.0	0.00	0.00	3,900.0	639.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
4,000.0	0.00	0.00	4,000.0	739.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
4,100.0	0.00	0.00	4,100.0	839.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
4,200.0	0.00	0.00	4,200.0	939.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
4,300.0	0.00	0.00	4,300.0	1,039.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
4,400.0	0.00	0.00	4,400.0	1,139.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
4,500.0	0.00	0.00	4,500.0	1,239.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
4,600.0	0.00	0.00	4,600.0	1,339.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
4,700.0	0.00	0.00	4,700.0	1,439.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
4,800.0	0.00	0.00	4,800.0	1,539.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
4,900.0	0.00	0.00	4,900.0	1,639.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
5,000.0	0.00	0.00	5,000.0	1,739.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
5,100.0	0.00	0.00	5,100.0	1,839.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
5,200.0	0.00	0.00	5,200.0	1,939.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
5,300.0	0.00	0.00	5,300.0	2,039.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

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Wellbore: OH
Design: Plan #1

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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)		
5,400.0	0.00	0.00	5,400.0	2,139.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
5,500.0	0.00	0.00	5,500.0	2,239.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
5,600.0	0.00	0.00	5,600.0	2,339.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
5,700.0	0.00	0.00	5,700.0	2,439.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
5,800.0	0.00	0.00	5,800.0	2,539.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
5,900.0	0.00	0.00	5,900.0	2,639.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
6,000.0	0.00	0.00	6,000.0	2,739.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
6,100.0	0.00	0.00	6,100.0	2,839.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
6,200.0	0.00	0.00	6,200.0	2,939.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
6,300.0	0.00	0.00	6,300.0	3,039.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
6,400.0	0.00	0.00	6,400.0	3,139.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
6,500.0	0.00	0.00	6,500.0	3,239.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
6,600.0	0.00	0.00	6,600.0	3,339.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
6,700.0	0.00	0.00	6,700.0	3,439.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
6,800.0	0.00	0.00	6,800.0	3,539.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
6,900.0	0.00	0.00	6,900.0	3,639.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
7,000.0	0.00	0.00	7,000.0	3,739.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
7,100.0	0.00	0.00	7,100.0	3,839.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
7,200.0	0.00	0.00	7,200.0	3,939.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
7,300.0	0.00	0.00	7,300.0	4,039.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
7,400.0	0.00	0.00	7,400.0	4,139.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
7,500.0	0.00	0.00	7,500.0	4,239.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
7,600.0	0.00	0.00	7,600.0	4,339.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
7,700.0	0.00	0.00	7,700.0	4,439.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
7,800.0	0.00	0.00	7,800.0	4,539.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
7,900.0	0.00	0.00	7,900.0	4,639.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		
8,000.0	0.00	0.00	8,000.0	4,739.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80		



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Bufflehead 10 Fed
Well: #2H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well #2H
KB = 18' @ 3261.0usft (Original Well Elev)
KB = 18' @ 3261.0usft (Original Well Elev)
Grid
Minimum Curvature
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)
8,100.0	0.00	0.00	8,100.0	4,839.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
8,200.0	0.00	0.00	8,200.0	4,939.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
8,300.0	0.00	0.00	8,300.0	5,039.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
8,400.0	0.00	0.00	8,400.0	5,139.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
8,500.0	0.00	0.00	8,500.0	5,239.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
8,600.0	0.00	0.00	8,600.0	5,339.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
8,700.0	0.00	0.00	8,700.0	5,439.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
8,800.0	0.00	0.00	8,800.0	5,539.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
8,900.0	0.00	0.00	8,900.0	5,639.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
9,000.0	0.00	0.00	9,000.0	5,739.0	0.0	0.0	0.0	0.00	387,657.40	710,038.80
9,052.5	0.00	0.00	9,052.5	5,791.5	0.0	0.0	0.0	0.00	387,657.40	710,038.80
9,075.0	2.70	177.47	9,075.0	5,814.0	-0.5	0.0	0.5	12.00	387,656.87	710,038.82
9,100.0	5.70	177.47	9,099.9	5,838.9	-2.4	0.1	2.4	12.00	387,655.04	710,038.90
9,125.0	8.70	177.47	9,124.7	5,863.7	-5.5	0.2	5.5	12.00	387,651.91	710,039.04
9,150.0	11.70	177.47	9,149.3	5,888.3	-9.9	0.4	9.9	12.00	387,647.49	710,039.24
9,175.0	14.70	177.47	9,173.7	5,912.7	-15.6	0.7	15.6	12.00	387,641.79	710,039.49
9,200.0	17.70	177.47	9,197.7	5,936.7	-22.6	1.0	22.6	12.00	387,634.82	710,039.80
9,225.0	20.70	177.47	9,221.3	5,960.3	-30.8	1.4	30.8	12.00	387,626.61	710,040.16
9,250.0	23.70	177.47	9,244.4	5,983.4	-40.2	1.8	40.3	12.00	387,617.17	710,040.57
9,275.0	26.70	177.47	9,267.0	6,006.0	-50.9	2.2	50.9	12.00	387,606.54	710,041.04
9,300.0	29.70	177.47	9,289.1	6,028.1	-62.7	2.8	62.7	12.00	387,594.74	710,041.56
9,325.0	32.70	177.47	9,310.4	6,049.4	-75.6	3.3	75.7	12.00	387,581.80	710,042.13
9,350.0	35.70	177.47	9,331.1	6,070.1	-89.6	4.0	89.7	12.00	387,567.76	710,042.75
9,375.0	38.70	177.47	9,351.0	6,090.0	-104.7	4.6	104.8	12.00	387,552.67	710,043.42
9,400.0	41.70	177.47	9,370.1	6,109.1	-120.9	5.3	121.0	12.00	387,536.55	710,044.13
9,425.0	44.70	177.47	9,388.3	6,127.3	-137.9	6.1	138.1	12.00	387,519.45	710,044.88
9,450.0	47.70	177.47	9,405.6	6,144.6	-156.0	6.9	156.1	12.00	387,501.43	710,045.68



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Lea County(NAD27)	TVD Reference:	KB = 18' @ 3261 0usft (Original Well Elev)
Site:	Bufflehead 10 Fed	MD Reference:	KB = 18' @ 3261 0usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey/Calculation Method:	Minimum Curvature
Design:	Plan #1	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)		
9,475 0	50.70	177 47	9,422 0	6,161 0	-174 9	7 7	175 0	12 00	387,482 52	710,046 51		
9,500 0	53.70	177 47	9,437 3	6,176 3	-194 6	8 6	194 8	12 00	387,462 79	710,047 38		
9,525.0	56 70	177 47	9,451.6	6,190 6	-215.1	9 5	215 3	12 00	387,442 28	710,048 29		
9,550 0	59 70	177 47	9,464.7	6,203 7	-236 3	10 4	236.6	12.00	387,421 06	710,049.22		
9,575 0	62 70	177 47	9,476 8	6,215 8	-258 2	11 4	258 5	12 00	387,399 18	710,050.19		
9,600 0	65.70	177 47	9,487 7	6,226.7	-280 7	12 4	281 0	12 00	387,376 69	710,051 18		
9,625 0	68 70	177 47	9,497 3	6,236 3	-303 7	13 4	304 0	12 00	387,353 67	710,052 20		
9,650 0	71 70	177 47	9,505.8	6,244.8	-327 2	14 4	327 5	12 00	387,330 17	710,053 23		
9,675 0	74 70	177 47	9,513 0	6,252.0	-351.1	15.5	351 5	12 00	387,306 27	710,054.29		
9,700.0	77 70	177 47	9,519 0	6,258 0	-375 4	16 6	375 8	12 00	387,282 01	710,055 36		
9,725 0	80 70	177 47	9,523 7	6,262 7	-399 9	17 6	400 3	12.00	387,257 48	710,056 44		
9,750 0	83 70	177 47	9,527.1	6,266 1	-424.7	18 7	425 1	12 00	387,232 74	710,057.53		
9,775 0	86 70	177 47	9,529.2	6,268 2	-449 5	19 8	450 0	12.00	387,207.86	710,058 63		
9,802 5	90 00	177.47	9,530 0	6,269 0	-477.0	21 0	477 5	12 00	387,180 40	710,059 84		
9,900 0	90 00	177 47	9,530 0	6,269 0	-574 4	25 3	575 0	0 00	387,082 99	710,064 13		
10,000 0	90.00	177 47	9,530 0	6,269.0	-674 3	29 7	675.0	0 00	386,983.09	710,068 54		
10,100 0	90 00	177 47	9,530 0	6,269 0	-774 2	34 1	775 0	0 00	386,883 19	710,072.95		
10,200.0	90 00	177 47	9,530 0	6,269 0	-874 1	38 6	875 0	0 00	386,783.28	710,077.35		
10,300 0	90 00	177 47	9,530 0	6,269 0	-974 0	43 0	975 0	0.00	386,683 38	710,081 76		
10,400 0	90 00	177 47	9,530 0	6,269 0	-1,073 9	47 4	1,075.0	0 00	386,583 48	710,086 17		
10,500 0	90 00	177 47	9,530 0	6,269.0	-1,173 8	51 8	1,175 0	0.00	386,483 58	710,090 57		
10,600 0	90 00	177 47	9,530 0	6,269.0	-1,273 7	56.2	1,275 0	0 00	386,383.67	710,094 98		
10,700 0	90 00	177 47	9,530 0	6,269 0	-1,373 6	60 6	1,375 0	0 00	386,283 77	710,099 38		
10,800.0	90 00	177 47	9,530 0	6,269.0	-1,473 5	65.0	1,475 0	0 00	386,183.87	710,103 79		
10,900 0	90.00	177.47	9,530 0	6,269 0	-1,573 4	69 4	1,575 0	0 00	386,083 96	710,108 20		
11,000 0	90.00	177 47	9,530.0	6,269 0	-1,673 3	73 8	1,675 0	0 00	385,984.06	710,112.60		
11,100 0	90.00	177 47	9,530 0	6,269 0	-1,773 2	78 2	1,775.0	0 00	385,884 16	710,117 01		



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Lea County(NAD27)	TVD Reference:	KB = 18' @ 3261.0usft (Original Well Elev)
Site:	Bufflehead 10 Fed	MD Reference:	KB = 18' @ 3261.0usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	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)	
11,200.0	90.00	177.47	9,530.0	6,269.0	-1,873.1	82.6	1,875.0	0.00	385,784.26	710,121.42	
11,300.0	90.00	177.47	9,530.0	6,269.0	-1,973.0	87.0	1,975.0	0.00	385,684.35	710,125.82	
11,400.0	90.00	177.47	9,530.0	6,269.0	-2,072.9	91.4	2,075.0	0.00	385,584.45	710,130.23	
11,500.0	90.00	177.47	9,530.0	6,269.0	-2,172.9	95.8	2,175.0	0.00	385,484.55	710,134.63	
11,600.0	90.00	177.47	9,530.0	6,269.0	-2,272.8	100.2	2,275.0	0.00	385,384.64	710,139.04	
11,700.0	90.00	177.47	9,530.0	6,269.0	-2,372.7	104.6	2,375.0	0.00	385,284.74	710,143.45	
11,800.0	90.00	177.47	9,530.0	6,269.0	-2,472.6	109.1	2,475.0	0.00	385,184.84	710,147.85	
11,900.0	90.00	177.47	9,530.0	6,269.0	-2,572.5	113.5	2,575.0	0.00	385,084.94	710,152.26	
12,000.0	90.00	177.47	9,530.0	6,269.0	-2,672.4	117.9	2,675.0	0.00	384,985.03	710,156.67	
12,100.0	90.00	177.47	9,530.0	6,269.0	-2,772.3	122.3	2,775.0	0.00	384,885.13	710,161.07	
12,200.0	90.00	177.47	9,530.0	6,269.0	-2,872.2	126.7	2,875.0	0.00	384,785.23	710,165.48	
12,300.0	90.00	177.47	9,530.0	6,269.0	-2,972.1	131.1	2,975.0	0.00	384,685.32	710,169.88	
12,400.0	90.00	177.47	9,530.0	6,269.0	-3,072.0	135.5	3,075.0	0.00	384,585.42	710,174.29	
12,500.0	90.00	177.47	9,530.0	6,269.0	-3,171.9	139.9	3,175.0	0.00	384,485.52	710,178.70	
12,600.0	90.00	177.47	9,530.0	6,269.0	-3,271.8	144.3	3,275.0	0.00	384,385.62	710,183.10	
12,700.0	90.00	177.47	9,530.0	6,269.0	-3,371.7	148.7	3,375.0	0.00	384,285.71	710,187.51	
12,800.0	90.00	177.47	9,530.0	6,269.0	-3,471.6	153.1	3,475.0	0.00	384,185.81	710,191.92	
12,900.0	90.00	177.47	9,530.0	6,269.0	-3,571.5	157.5	3,575.0	0.00	384,085.91	710,196.32	
13,000.0	90.00	177.47	9,530.0	6,269.0	-3,671.4	161.9	3,675.0	0.00	383,986.00	710,200.73	
13,100.0	90.00	177.47	9,530.0	6,269.0	-3,771.3	166.3	3,775.0	0.00	383,886.10	710,205.13	
13,200.0	90.00	177.47	9,530.0	6,269.0	-3,871.2	170.7	3,875.0	0.00	383,786.20	710,209.54	
13,300.0	90.00	177.47	9,530.0	6,269.0	-3,971.1	175.1	3,975.0	0.00	383,686.30	710,213.95	
13,400.0	90.00	177.47	9,530.0	6,269.0	-4,071.0	179.6	4,075.0	0.00	383,586.39	710,218.35	
13,500.0	90.00	177.47	9,530.0	6,269.0	-4,170.9	184.0	4,175.0	0.00	383,486.49	710,222.76	
13,600.0	90.00	177.47	9,530.0	6,269.0	-4,270.8	188.4	4,275.0	0.00	383,386.59	710,227.17	
13,700.0	90.00	177.47	9,530.0	6,269.0	-4,370.7	192.8	4,375.0	0.00	383,286.68	710,231.57	
13,800.0	90.00	177.47	9,530.0	6,269.0	-4,470.6	197.2	4,475.0	0.00	383,186.78	710,235.98	



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC		Local Co-ordinate Reference:				Well #2H			
Project:	Lea County(NAD27)		TVD Reference:				KB = 18' @ 3261.0usft (Original Well Elev)			
Site:	Bufflehead 10 Fed		MD Reference:				KB = 18' @ 3261 0usft (Original Well Elev)			
Well:	#2H		North Reference:				Grid			
Wellbore:	OH		Survey/Calculation Method:				Minimum Curvature			
Design:	Plan #1		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)
13,900 0	90 00	177 47	9,530.0	6,269 0	-4,570 5	201 6	4,575 0	0 00	383,086 88	710,240 38
14,000.0	90.00	177 47	9,530 0	6,269 0	-4,670 4	206.0	4,675 0	0 00	382,986 98	710,244 79
14,016 1	90 00	177 47	9,530 0	6,269 0	-4,686 5	206 7	4,691 1	0 00	382,970 90	710,245.50

Checked By: _____ Approved By: _____ Date: _____



Project: Lea County(NAD27)
Site: Bufflehead 10 Fed
Well: #2H
Wellbore: OH
Plan: Plan #1 (#2H/OH)

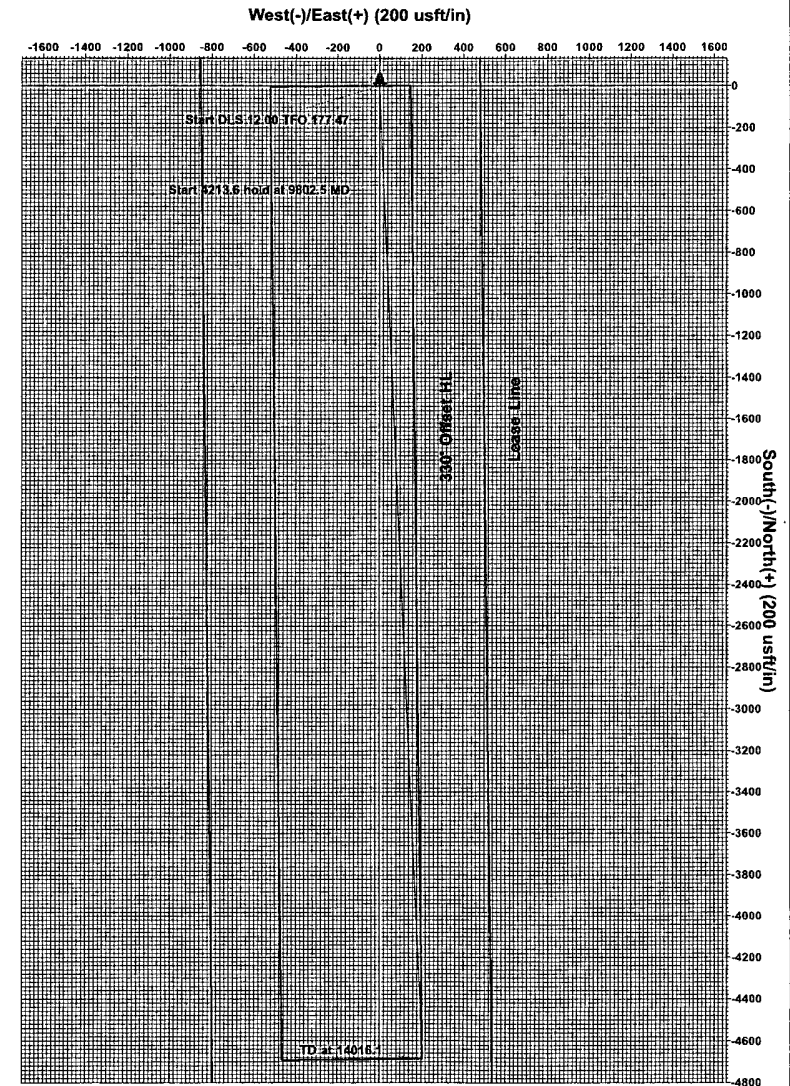
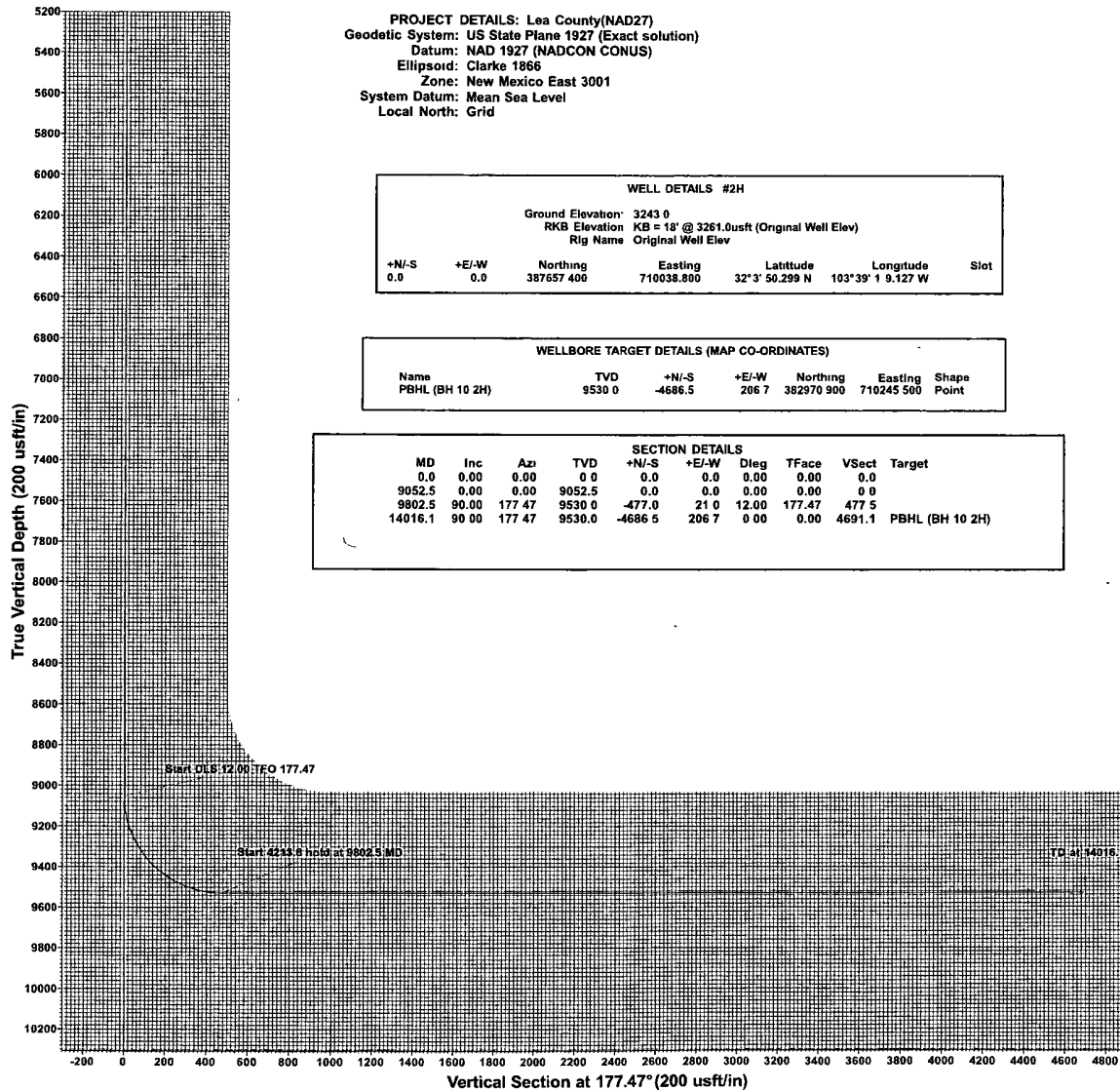


Azimuths to Grid North
True North: -0.36°
Magnetic North: 7.16°

Magnetic Field
Strength: 48480.9snT
Dip Angle: 60.03°
Date: 2/28/2012
Model: IGRF200510

PATHFINDER®

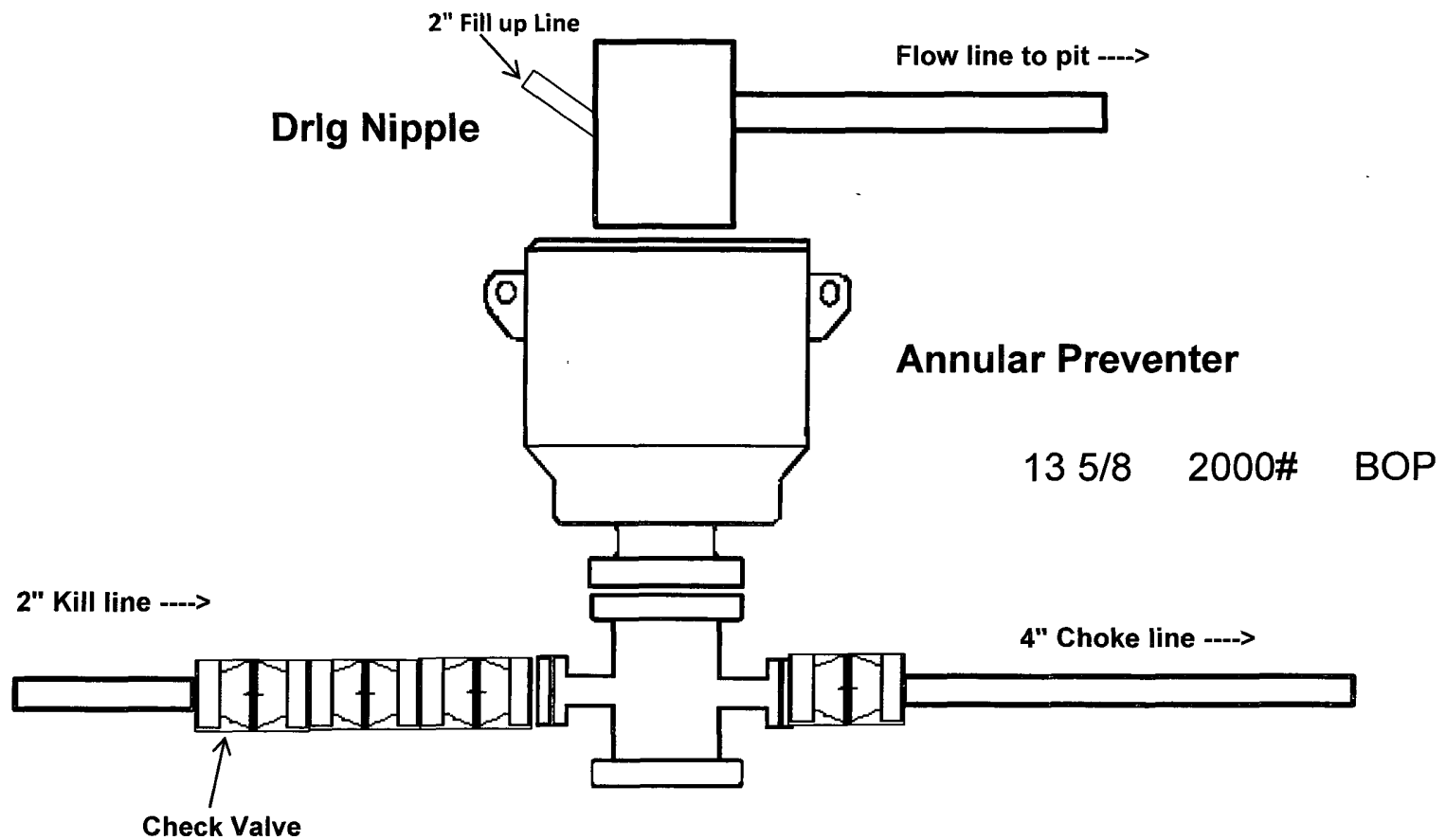
A Schlumberger Company



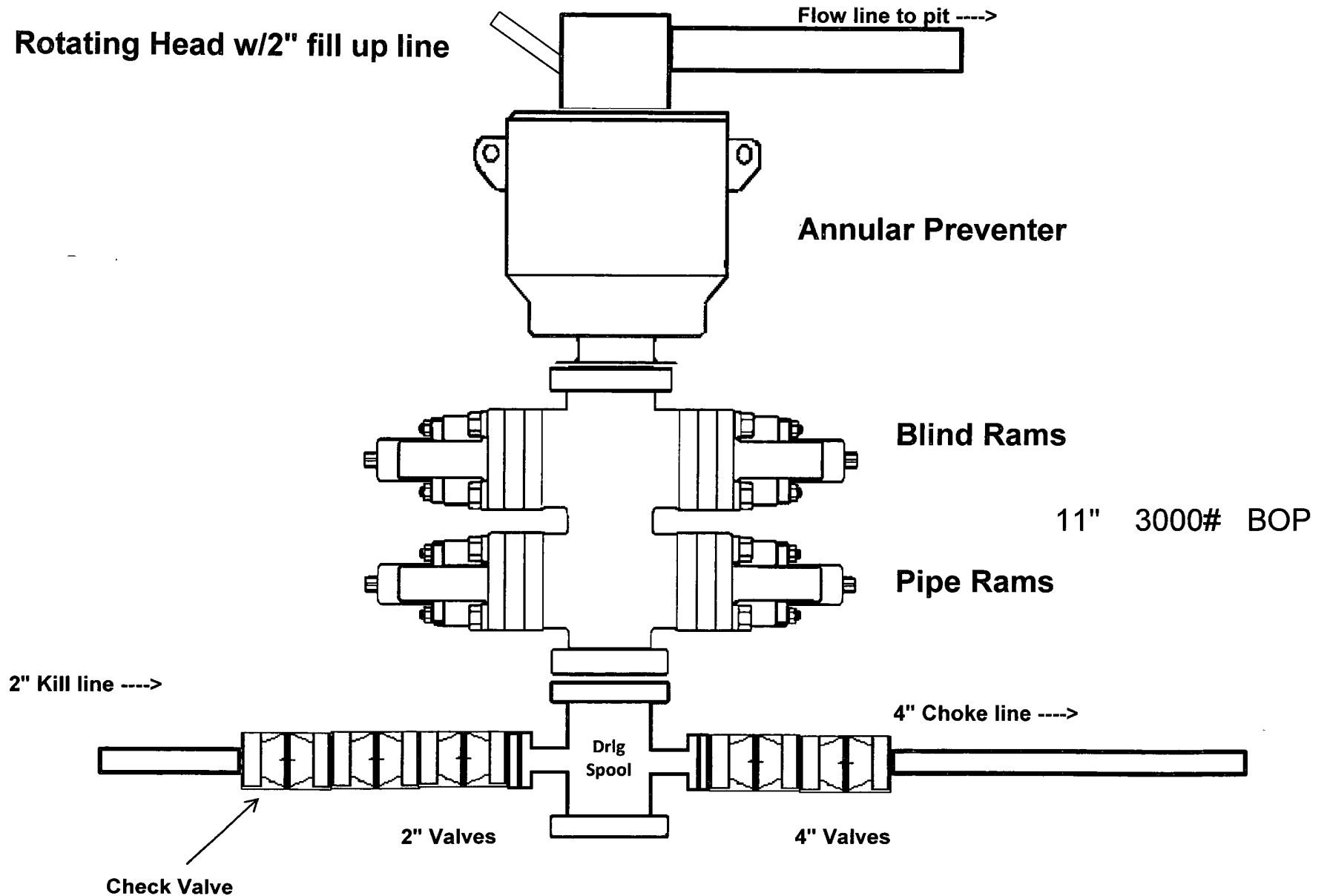
Plan Plan #1 (#2H/OH)	
Created By: Michael Trout	Date: 14 22, February 28 2012
Checked: _____	Date: _____

COG Operating LLC
Lea County(NAD27)
Bufflehead 10 Fed
#2H
Original Well Elev
OH
Plan #1

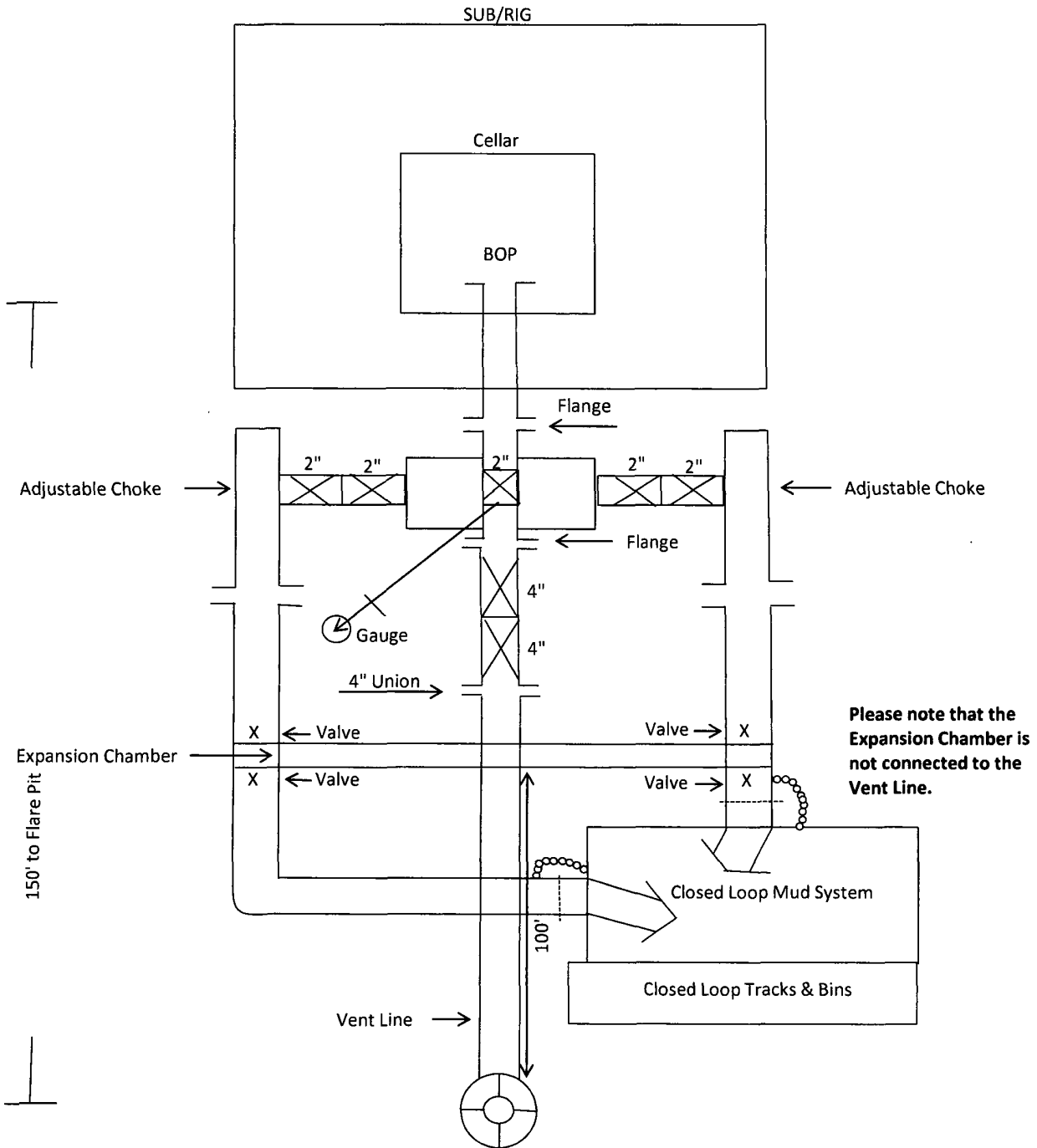
2,000 psi BOP Schematic



3,000 psi BOP Schematic



2M Choke Manifold Equipment



3M Choke Manifold Equipment

