

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

Type of Work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NMNM103595
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.
Address 2208 West Main Street Artesia, NM 88210	3b. Phone No. (include area code) 575-748-6940	8. Lease Name and Well No. Calh Roll 24 Federal #2H
Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 330' FNL & 430' FEL Unit Letter A (NENE) SHL At proposed prod. Zone 330' FSL & 380' FEL Unit Letter P (SESE) BHL		9. API Well No. 30-015-39388
Distance in miles and direction from nearest town or post office* About 10 miles from White City		10. Field and Pool, or Exploratory Wildcat; Bone Springs
Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any) 330'		11. Sec., T.R.M. or Blk and Survey or Area Sec. 24 - T26S - R25E
Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. 1200'		12. County or Parish Eddy County
Elevations (Show whether DF, KDB, RT, GL, etc.) 3546.8 GL		13. State NM
16. No. of acres in lease 600 acres		17. Spacing Unit dedicated to this well 160
19. Proposed Depth PHTD-9480 TVD.7843 MD:12332		20. BLM/BIA Bond No. on file NMB000740
22. Approximate date work will start* 8/15/2011		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.

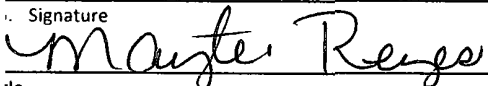
A Drilling Plan

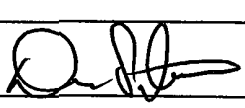
A Surface Use Plan (if the location is on National Forest System Lands, the SUPO shall be filed with the appropriate Forest Service Office).

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 authorized officer.

Signature 	Name (Printed/Typed) Mayte Reyes	Date 6/2/2011
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Regulatory Analyst Approved by (Signature) 	Name (Printed/Typed) Office CARLSBAD FIELD OFFICE	Date 8/30/11
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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

Under 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

**Approval Subject to General Requirements
& Special Stipulations Attached**

**SEE ATTACHED FOR
CONDITIONS OF APPROVAL**



COG Operating LLC
DRILLING AND OPERATIONS PROGRAM

Cali Roll 24 Federal #2H
SHL: 330' FNL & 430' FEL
BHL: 330' FSL & 380' FEL
Section 24 T26S R25E
Eddy County, New Mexico

In conjunction with Form 3160-3, Application for Permit to Drill subject well, COG Operating LLC submits the following ten 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	At Surface	
Top of Salt	490'	
Base of Salt	1394'	
Delaware	1580'	Oil
Bone Spring	5033'	
Avalon Shale	5230	
1 st BSS	5874'	Oil
2 nd BSS	6610'	Oil
3 rd BSS	7543'	Oil
Wolfcamp	7903'	
Strawn	9376'	
TD(Pilot)	9480'	
TVD	7873'	
TMD	12,340'	

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 and circulating cement back to surface. All oil/gas intervals will be isolated by setting 5-1/2" casing to total depth and circulating cement to surface.

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

Hole Size	Depths	Section	OD Casing	New/Used	Wt	Collar	Grade	Collapse Design Factor	Burst Design Factor	Tension Design Factor
7 1/2"	0' - 400'	Surface	13 3/8"	New	48#	STC	H-40	1.125	1.125	1.6
2 1/4"	0' - 1500'	Intrmd	9 5/8"	New	36#	STC	J-55	1.125	1.125	1.6
3/4"	0' - 9480'	Pilot Hole								
7/8"	8100' - 12,340'	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: 400 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: 250 sx Class C + 4% Gel + 2% CaCl₂
(12.7 ppg / 1.75 cuft/sx)
Tail: 250 sx Class C + 2% CaCl₂
(14.8 ppg / 1.35 cuft/sx)
**Calculated w/35% excess on OH volumes
- d. 5 1/2" Production 1st Stage:
Lead: 450 sx Class H + Acid soluble
(15.0 ppg / 2.6 cuft/sx)
2nd Stage:
Lead: 1000 sx Class H + Bentonite + HALAD-322
(12.7 ppg / 1.89 cuft/sx)
Tail: 100 sx Class H
(15.6 ppg / 1.19 cuft/sx)
3rd Stage:
Lead: 200 sx Class H + Bentonite + HALAD-322
(12.7 ppg / 1.89 cuft/sx)
Tail: 100 sx Class H
(15.6 ppg / 1.19 cuft/sx)
DVT @ 7300' & DVT/ECP @ 1600' (approx depths)
**Calculated w/35% excess on OH volumes

- The above cement volumes could be revised pending the caliper measurement from the open hole logs.
- The intermediate string TOC is designed to circulate cement to surface.
- The production string TOC is designed to circulate cement to surface.
- After logging the PH, will plug back to kick off point by setting the following plugs:

*See
Cen*

TD Plug f/PH TD – 9300'

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

Kick Off Plug f/7350' – 8000'

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

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 5M system tested to 5000# 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 5000 psi WP rating. Hydraulic choke will be installed to choke manifold with controls on rig floor.

6. Estimated BHP:

- a. PH TD = 4140 psi
- b. Lateral TD = 3451 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' – 400'	Fresh Water	8.4	29	N.C.
400' – 1500'	Brine	10	29	N.C.
1500' – 9480' (PH)	Cut Brine	9.0-9.4	29	N.C.
8100' – 12,380' (Lateral)	Cut Brine	9.0-9.4	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 COA*

- a. Drill stem tests will be based on geological sample shows.
- b. The open hole electrical logging 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. 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

- 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

Eddy County(NAD83)

Cali Roll 24 Federal

#2H

OH

Plan: Design #1

Pathfinder X & Y Planning Report

17 March, 2011



A Schlumberger Company



Pathfinder
Pathfinder X & Y Planning Report



Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Cali Roll 24 Federal
Well: #2H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #2H
TVD Reference: WELL @ 3563.10usft (17' KB)
MD Reference: WELL @ 3563.10usft (17' KB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

Project	Eddy County(NAD83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Cali Roll 24 Federal		
Site Position:		Northing:	376,201.450 usft
From:	Map	Easting:	538,706.230 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 2' 3.327 N
		Longitude:	104° 20' 30.569 W
		Grid Convergence:	0.00 °

Well #2H						
Well Position	+N/-S	0.00 usft	Northing:	376,201.450 usft	Latitude:	32° 2' 3.327 N
	+E/-W	0.00 usft	Easting:	538,706.230 usft	Longitude:	104° 20' 30.569 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,546.10 usft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF200510	03/17/11	(°)	(°)	(nT)
			7.94	59.90	48,475

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	180.58

Survey Tool Program	Date	03/17/11		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	12,331.11	Design #1 (OH)	MWD	MWD - Standard



Pathfinder
Pathfinder X & Y Planning Report



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Wellbore: OH
Design: Design #1

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

Well #2H
WELL @ 3563.10usft (17' KB)
WELL @ 3563.10usft (17' KB)
Grid
Minimum Curvature
EDM 5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (°)	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	3,563.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
100.00	0.00	0.00	100.00	3,463.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
200.00	0.00	0.00	200.00	3,363.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
300.00	0.00	0.00	300.00	3,263.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
400.00	0.00	0.00	400.00	3,163.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
500.00	0.00	0.00	500.00	3,063.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
600.00	0.00	0.00	600.00	2,963.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
700.00	0.00	0.00	700.00	2,863.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
800.00	0.00	0.00	800.00	2,763.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
900.00	0.00	0.00	900.00	2,663.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
1,000.00	0.00	0.00	1,000.00	2,563.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
1,100.00	0.00	0.00	1,100.00	2,463.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
1,200.00	0.00	0.00	1,200.00	2,363.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
1,300.00	0.00	0.00	1,300.00	2,263.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
1,400.00	0.00	0.00	1,400.00	2,163.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
1,500.00	0.00	0.00	1,500.00	2,063.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
1,600.00	0.00	0.00	1,600.00	1,963.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
1,700.00	0.00	0.00	1,700.00	1,863.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
1,800.00	0.00	0.00	1,800.00	1,763.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
1,900.00	0.00	0.00	1,900.00	1,663.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
2,000.00	0.00	0.00	2,000.00	1,563.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
2,100.00	0.00	0.00	2,100.00	1,463.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
2,200.00	0.00	0.00	2,200.00	1,363.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
2,300.00	0.00	0.00	2,300.00	1,263.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
2,400.00	0.00	0.00	2,400.00	1,163.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
2,500.00	0.00	0.00	2,500.00	1,063.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
2,600.00	0.00	0.00	2,600.00	963.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	



Pathfinder
Pathfinder X & Y Planning Report



Company: COG Operating LLC
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Site: Cali Roll 24 Federal
Well: #2H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #2H
TVD Reference: WELL @ 3563.10usft (17' KB)
MD Reference: WELL @ 3563.10usft (17' KB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (°)	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	863.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
2,800.00	0.00	0.00	2,800.00	763.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
2,900.00	0.00	0.00	2,900.00	663.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
3,000.00	0.00	0.00	3,000.00	563.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
3,100.00	0.00	0.00	3,100.00	463.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
3,200.00	0.00	0.00	3,200.00	363.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
3,300.00	0.00	0.00	3,300.00	263.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
3,400.00	0.00	0.00	3,400.00	163.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
3,500.00	0.00	0.00	3,500.00	63.10	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
3,600.00	0.00	0.00	3,600.00	-36.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
3,700.00	0.00	0.00	3,700.00	-136.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
3,800.00	0.00	0.00	3,800.00	-236.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
3,900.00	0.00	0.00	3,900.00	-336.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
4,000.00	0.00	0.00	4,000.00	-436.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
4,100.00	0.00	0.00	4,100.00	-536.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
4,200.00	0.00	0.00	4,200.00	-636.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
4,300.00	0.00	0.00	4,300.00	-736.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
4,400.00	0.00	0.00	4,400.00	-836.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
4,500.00	0.00	0.00	4,500.00	-936.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
4,600.00	0.00	0.00	4,600.00	-1,036.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
4,700.00	0.00	0.00	4,700.00	-1,136.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
4,800.00	0.00	0.00	4,800.00	-1,236.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
4,900.00	0.00	0.00	4,900.00	-1,336.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
5,000.00	0.00	0.00	5,000.00	-1,436.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
5,100.00	0.00	0.00	5,100.00	-1,536.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
5,200.00	0.00	0.00	5,200.00	-1,636.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
5,300.00	0.00	0.00	5,300.00	-1,736.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	



Pathfinder
Pathfinder X & Y Planning Report



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Wellbore: OH
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5,400.00	0.00	0.00	5,400.00	-1,836.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
5,500.00	0.00	0.00	5,500.00	-1,936.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
5,600.00	0.00	0.00	5,600.00	-2,036.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
5,700.00	0.00	0.00	5,700.00	-2,136.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
5,800.00	0.00	0.00	5,800.00	-2,236.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
5,900.00	0.00	0.00	5,900.00	-2,336.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
6,000.00	0.00	0.00	6,000.00	-2,436.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
6,100.00	0.00	0.00	6,100.00	-2,536.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
6,200.00	0.00	0.00	6,200.00	-2,636.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
6,300.00	0.00	0.00	6,300.00	-2,736.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
6,400.00	0.00	0.00	6,400.00	-2,836.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
6,500.00	0.00	0.00	6,500.00	-2,936.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
6,600.00	0.00	0.00	6,600.00	-3,036.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
6,700.00	0.00	0.00	6,700.00	-3,136.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
6,800.00	0.00	0.00	6,800.00	-3,236.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
6,900.00	0.00	0.00	6,900.00	-3,336.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
7,000.00	0.00	0.00	7,000.00	-3,436.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
7,100.00	0.00	0.00	7,100.00	-3,536.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
7,200.00	0.00	0.00	7,200.00	-3,636.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
7,300.00	0.00	0.00	7,300.00	-3,736.90	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
7,395.50	0.00	0.00	7,395.50	-3,832.40	0.00	0.00	0.00	0.00	376,201.45	538,706.23	
7,400.00	0.54	184.50	7,400.00	-3,836.90	-0.02	0.00	0.02	12.00	376,201.43	538,706.23	
7,425.00	3.54	184.50	7,424.98	-3,861.88	-0.91	-0.07	0.91	12.00	376,200.54	538,706.16	
7,450.00	6.54	184.50	7,449.88	-3,886.78	-3.10	-0.24	3.10	12.00	376,198.35	538,705.99	
7,475.00	9.54	184.50	7,474.63	-3,911.53	-6.58	-0.52	6.59	12.00	376,194.87	538,705.71	
7,500.00	12.54	184.50	7,499.17	-3,936.07	-11.35	-0.89	11.36	12.00	376,190.10	538,705.34	
7,525.00	15.54	184.50	7,523.42	-3,960.32	-17.40	-1.37	17.41	12.00	376,184.05	538,704.86	



Pathfinder
Pathfinder X & Y Planning Report



Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Cali Roll 24 Federal
Well: #2H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #2H
TVD Reference: WELL @ 3563.10usft (17' KB)
MD Reference: WELL @ 3563.10usft (17' KB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey										
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
7,550.00	18.54	184.50	7,547.32	-3,984.22	-24.70	-1.94	24.72	12.00	376,176.75	538,704.29
7,575.00	21.54	184.50	7,570.80	-4,007.70	-33.24	-2.62	33.26	12.00	376,168.21	538,703.61
7,600.00	24.54	184.50	7,593.81	-4,030.71	-42.99	-3.38	43.02	12.00	376,158.46	538,702.85
7,625.00	27.54	184.50	7,616.27	-4,053.17	-53.93	-4.24	53.97	12.00	376,147.52	538,701.99
7,650.00	30.54	184.50	7,638.12	-4,075.02	-66.03	-5.20	66.08	12.00	376,135.42	538,701.03
7,675.00	33.54	184.50	7,659.31	-4,096.21	-79.25	-6.24	79.30	12.00	376,122.20	538,699.99
7,700.00	36.54	184.50	7,679.78	-4,116.68	-93.55	-7.36	93.62	12.00	376,107.90	538,698.87
7,725.00	39.54	184.50	7,699.47	-4,136.37	-108.91	-8.57	108.99	12.00	376,092.54	538,697.66
7,750.00	42.54	184.50	7,718.32	-4,155.22	-125.27	-9.86	125.36	12.00	376,076.18	538,696.37
7,775.00	45.54	184.50	7,736.29	-4,173.19	-142.59	-11.22	142.70	12.00	376,058.86	538,695.01
7,800.00	48.54	184.50	7,753.33	-4,190.23	-160.83	-12.66	160.94	12.00	376,040.62	538,693.57
7,825.00	51.53	184.50	7,769.39	-4,206.29	-179.93	-14.16	180.06	12.00	376,021.52	538,692.07
7,850.00	54.53	184.50	7,784.42	-4,221.32	-199.84	-15.73	199.98	12.00	376,001.61	538,690.50
7,875.00	57.53	184.50	7,798.38	-4,235.28	-220.50	-17.35	220.67	12.00	375,980.95	538,688.88
7,900.00	60.53	184.50	7,811.24	-4,248.14	-241.87	-19.04	242.05	12.00	375,959.58	538,687.19
7,925.00	63.53	184.50	7,822.97	-4,259.87	-263.88	-20.77	264.08	12.00	375,937.57	538,685.46
7,950.00	66.53	184.50	7,833.52	-4,270.42	-286.47	-22.55	286.69	12.00	375,914.98	538,683.68
7,975.00	69.53	184.50	7,842.87	-4,279.77	-309.59	-24.36	309.81	12.00	375,891.86	538,681.87
8,000.00	72.53	184.50	7,850.99	-4,287.89	-333.15	-26.22	333.40	12.00	375,868.30	538,680.01
8,025.00	75.53	184.50	7,857.87	-4,294.77	-357.11	-28.11	357.38	12.00	375,844.34	538,678.12
8,050.00	78.53	184.50	7,863.48	-4,300.38	-381.40	-30.02	381.68	12.00	375,820.05	538,676.21
8,075.00	81.53	184.50	7,867.81	-4,304.71	-405.94	-31.95	406.24	12.00	375,795.51	538,674.28
8,100.00	84.53	184.50	7,870.84	-4,307.74	-430.68	-33.89	430.99	12.00	375,770.77	538,672.34
8,125.00	87.53	184.50	7,872.57	-4,309.47	-455.54	-35.85	455.87	12.00	375,745.91	538,670.38
8,148.99	90.41	184.50	7,873.00	-4,309.90	-479.45	-37.73	479.80	12.00	375,722.00	538,668.50
8,200.00	90.41	183.48	7,872.63	-4,309.53	-530.33	-41.28	530.72	2.00	375,671.12	538,664.95
8,300.00	90.41	181.48	7,871.92	-4,308.82	-630.23	-45.61	630.66	2.00	375,571.22	538,660.62



Pathfinder
Pathfinder X & Y Planning Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Cali Roll 24 Federal
Well: #2H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #2H
TVD Reference: WELL @ 3563.10usft (17' KB)
MD Reference: WELL @ 3563.10usft (17' KB)
North Reference: Gnd
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
8,373.72	90.41	180.01	7,871.39	-4,308.29	-703.94	-46.56	704.37	2.00	375,497.51	538,659.67	
8,400.00	90.41	180.01	7,871.20	-4,308.10	-730.22	-46.57	730.65	0.00	375,471.23	538,659.66	
8,500.00	90.41	180.01	7,870.48	-4,307.38	-830.21	-46.58	830.64	0.00	375,371.24	538,659.65	
8,600.00	90.41	180.01	7,869.77	-4,306.67	-930.21	-46.58	930.63	0.00	375,271.24	538,659.65	
8,700.00	90.41	180.01	7,869.05	-4,305.95	-1,030.21	-46.59	1,030.63	0.00	375,171.24	538,659.64	
8,800.00	90.41	180.01	7,868.33	-4,305.23	-1,130.21	-46.60	1,130.62	0.00	375,071.24	538,659.63	
8,900.00	90.41	180.01	7,867.61	-4,304.51	-1,230.20	-46.61	1,230.61	0.00	374,971.25	538,659.62	
9,000.00	90.41	180.01	7,866.90	-4,303.80	-1,330.20	-46.62	1,330.60	0.00	374,871.25	538,659.61	
9,100.00	90.41	180.01	7,866.18	-4,303.08	-1,430.20	-46.63	1,430.60	0.00	374,771.25	538,659.60	
9,200.00	90.41	180.01	7,865.46	-4,302.36	-1,530.20	-46.64	1,530.59	0.00	374,671.25	538,659.59	
9,300.00	90.41	180.01	7,864.75	-4,301.65	-1,630.19	-46.65	1,630.58	0.00	374,571.26	538,659.58	
9,400.00	90.41	180.01	7,864.03	-4,300.93	-1,730.19	-46.66	1,730.57	0.00	374,471.26	538,659.57	
9,500.00	90.41	180.01	7,863.31	-4,300.21	-1,830.19	-46.67	1,830.57	0.00	374,371.26	538,659.56	
9,600.00	90.41	180.01	7,862.59	-4,299.49	-1,930.19	-46.68	1,930.56	0.00	374,271.26	538,659.55	
9,700.00	90.41	180.01	7,861.88	-4,298.78	-2,030.18	-46.69	2,030.55	0.00	374,171.27	538,659.54	
9,800.00	90.41	180.01	7,861.16	-4,298.06	-2,130.18	-46.70	2,130.54	0.00	374,071.27	538,659.53	
9,900.00	90.41	180.01	7,860.44	-4,297.34	-2,230.18	-46.71	2,230.54	0.00	373,971.27	538,659.52	
10,000.00	90.41	180.01	7,859.72	-4,296.62	-2,330.18	-46.71	2,330.53	0.00	373,871.27	538,659.52	
10,100.00	90.41	180.01	7,859.01	-4,295.91	-2,430.17	-46.72	2,430.52	0.00	373,771.28	538,659.51	
10,200.00	90.41	180.01	7,858.29	-4,295.19	-2,530.17	-46.73	2,530.51	0.00	373,671.28	538,659.50	
10,300.00	90.41	180.01	7,857.57	-4,294.47	-2,630.17	-46.74	2,630.51	0.00	373,571.28	538,659.49	
10,400.00	90.41	180.01	7,856.86	-4,293.76	-2,730.17	-46.75	2,730.50	0.00	373,471.28	538,659.48	
10,500.00	90.41	180.01	7,856.14	-4,293.04	-2,830.16	-46.76	2,830.49	0.00	373,371.29	538,659.47	
10,600.00	90.41	180.01	7,855.42	-4,292.32	-2,930.16	-46.77	2,930.48	0.00	373,271.29	538,659.46	
10,700.00	90.41	180.01	7,854.70	-4,291.60	-3,030.16	-46.78	3,030.48	0.00	373,171.29	538,659.45	
10,800.00	90.41	180.01	7,853.99	-4,290.89	-3,130.16	-46.79	3,130.47	0.00	373,071.29	538,659.44	
10,900.00	90.41	180.01	7,853.27	-4,290.17	-3,230.15	-46.80	3,230.46	0.00	372,971.30	538,659.43	



Pathfinder
Pathfinder X & Y Planning Report



Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Cali Roll 24 Federal
Well: #2H
Wellbore: OH
Design: Design #1

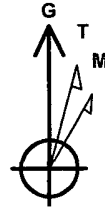
Local Co-ordinate Reference: Well #2H
TVD Reference: WELL @ 3563.10usft (17' KB)
MD Reference: WELL @ 3563.10usft (17' KB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey:											
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V-Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
11,000.00	90.41	180.01	7,852.55	-4,289.45	-3,330.15	-46.81	3,330.45	0.00	372,871.30	538,659.42	
11,100.00	90.41	180.01	7,851.83	-4,288.73	-3,430.15	-46.82	3,430.45	0.00	372,771.30	538,659.41	
11,200.00	90.41	180.01	7,851.12	-4,288.02	-3,530.15	-46.83	3,530.44	0.00	372,671.30	538,659.40	
11,300.00	90.41	180.01	7,850.40	-4,287.30	-3,630.14	-46.83	3,630.43	0.00	372,571.31	538,659.40	
11,400.00	90.41	180.01	7,849.68	-4,286.58	-3,730.14	-46.84	3,730.42	0.00	372,471.31	538,659.39	
11,500.00	90.41	180.01	7,848.97	-4,285.87	-3,830.14	-46.85	3,830.42	0.00	372,371.31	538,659.38	
11,600.00	90.41	180.01	7,848.25	-4,285.15	-3,930.14	-46.86	3,930.41	0.00	372,271.31	538,659.37	
11,700.00	90.41	180.01	7,847.53	-4,284.43	-4,030.13	-46.87	4,030.40	0.00	372,171.32	538,659.36	
11,800.00	90.41	180.01	7,846.81	-4,283.71	-4,130.13	-46.88	4,130.39	0.00	372,071.32	538,659.35	
11,900.00	90.41	180.01	7,846.10	-4,283.00	-4,230.13	-46.89	4,230.39	0.00	371,971.32	538,659.34	
12,000.00	90.41	180.01	7,845.38	-4,282.28	-4,330.12	-46.90	4,330.38	0.00	371,871.33	538,659.33	
12,100.00	90.41	180.01	7,844.66	-4,281.56	-4,430.12	-46.91	4,430.37	0.00	371,771.33	538,659.32	
12,200.00	90.41	180.01	7,843.95	-4,280.85	-4,530.12	-46.92	4,530.36	0.00	371,671.33	538,659.31	
12,300.00	90.41	180.01	7,843.23	-4,280.13	-4,630.12	-46.93	4,630.35	0.00	371,571.33	538,659.30	
12,331.75	90.41	180.01	7,843.00	-4,279.90	-4,661.87	-46.93	4,662.11	0.00	371,539.58	538,659.30	

Checked By: _____ Approved By: _____ Date: _____



Project: Eddy County(NAD83)
Site: Cali Roll 24 Federa
Well: #2H
Wellbore: OH
Plan: Design #1 (#2H/OH)

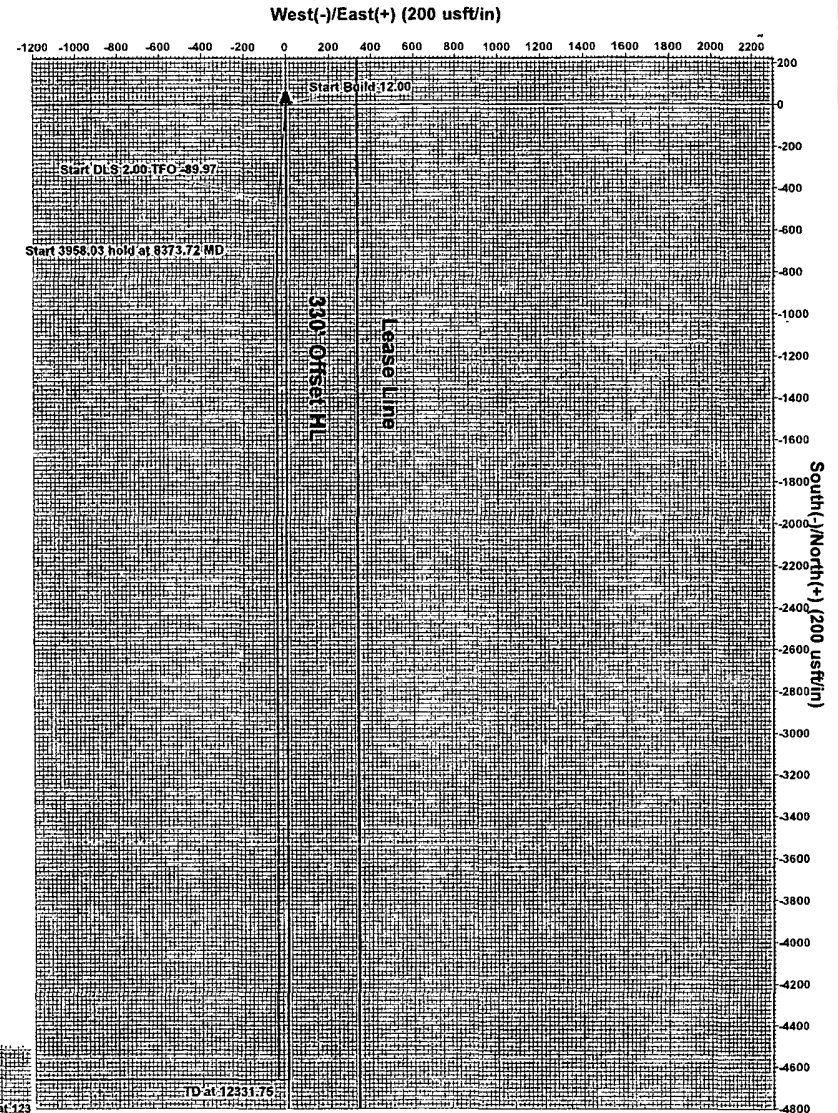
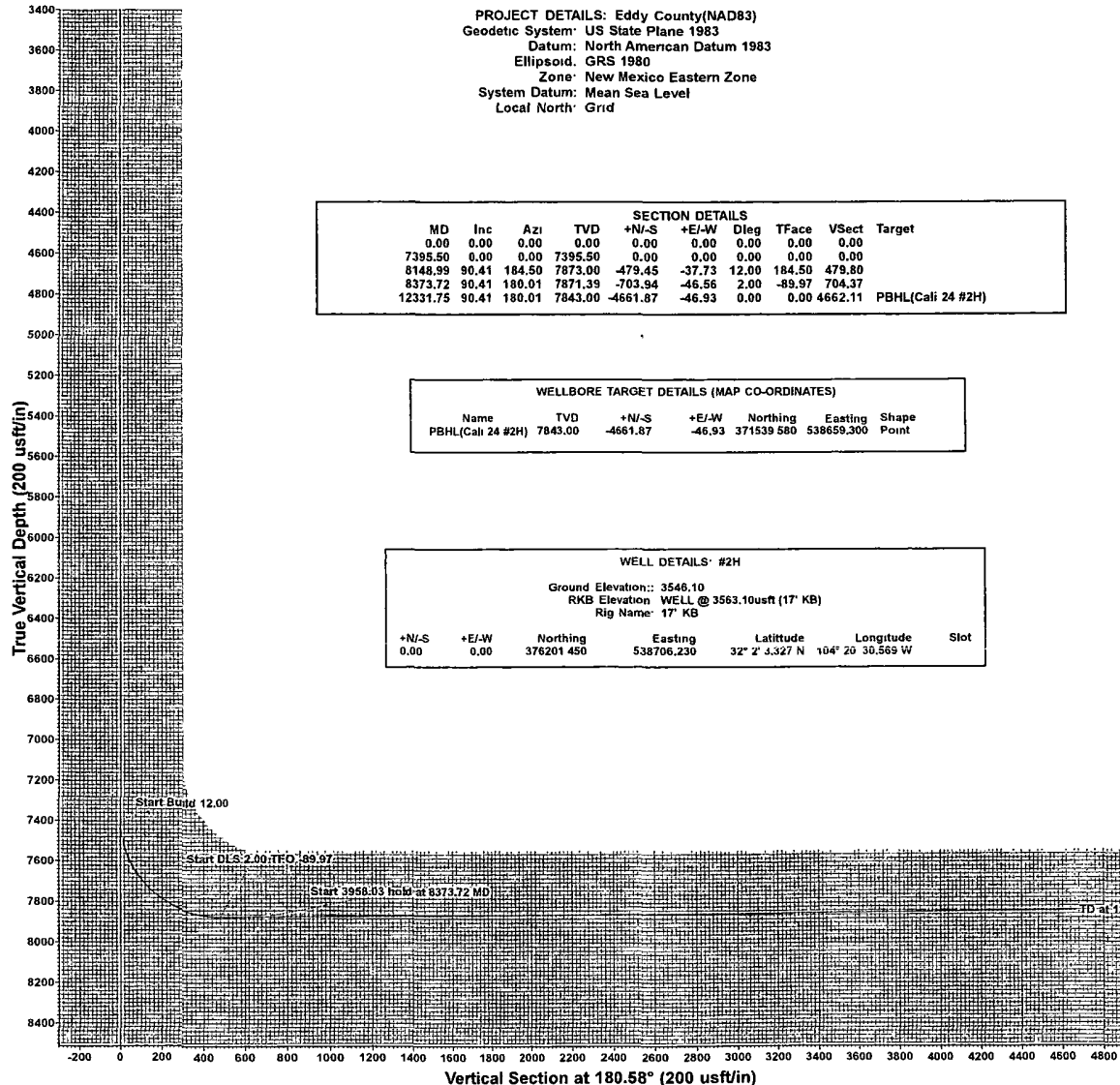


Azimuths to Grid North
True North: 0.01°
Magnetic North: 7.94°

Magnetic Field
Strength: 48475.2snT
Dip Angle: 59.90°
Date: 03/17/2011
Model: IGRF200510

PATHFINDER

A Schlumberger Company

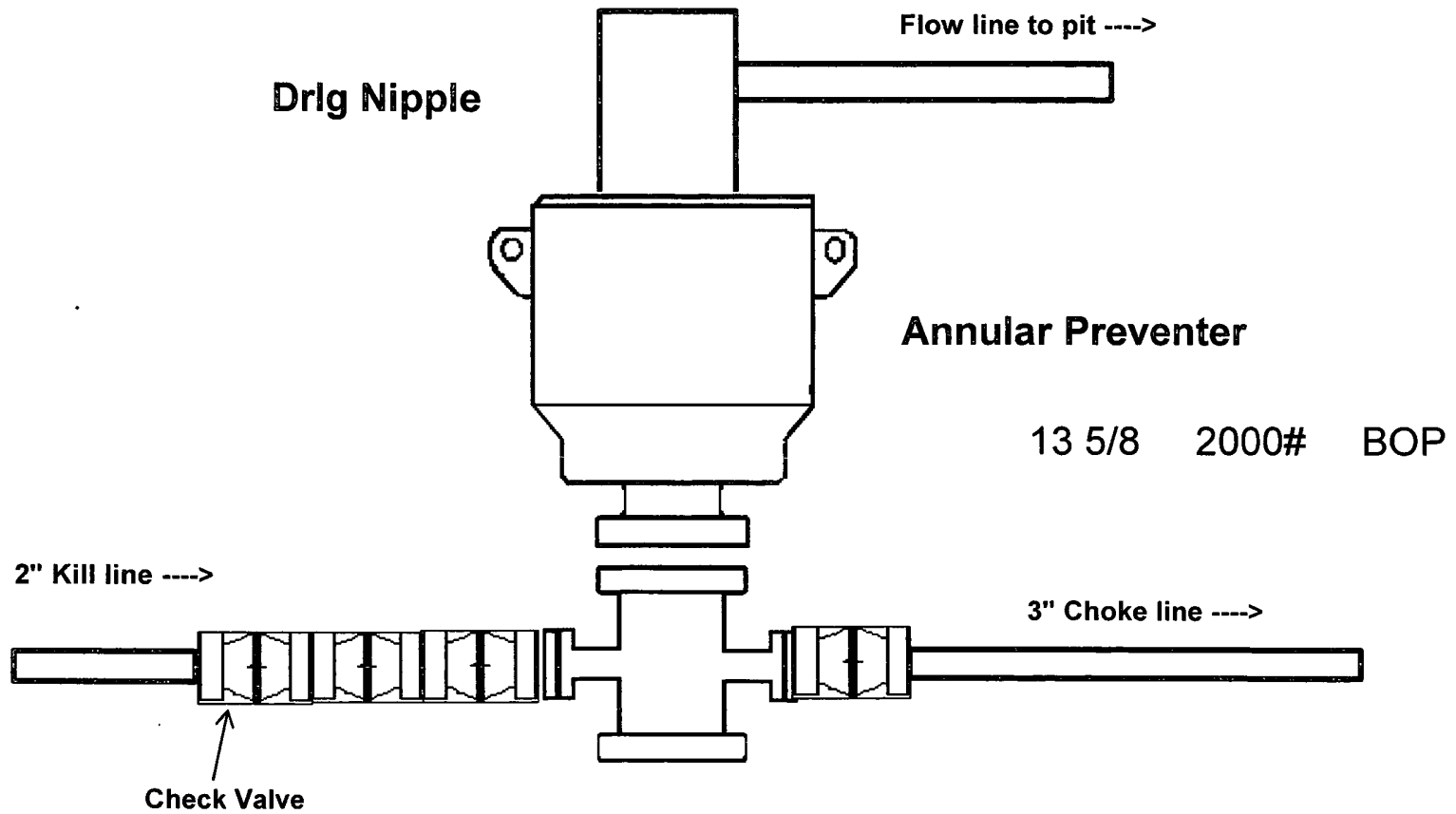


Plan Design #1 (#2H/OH)

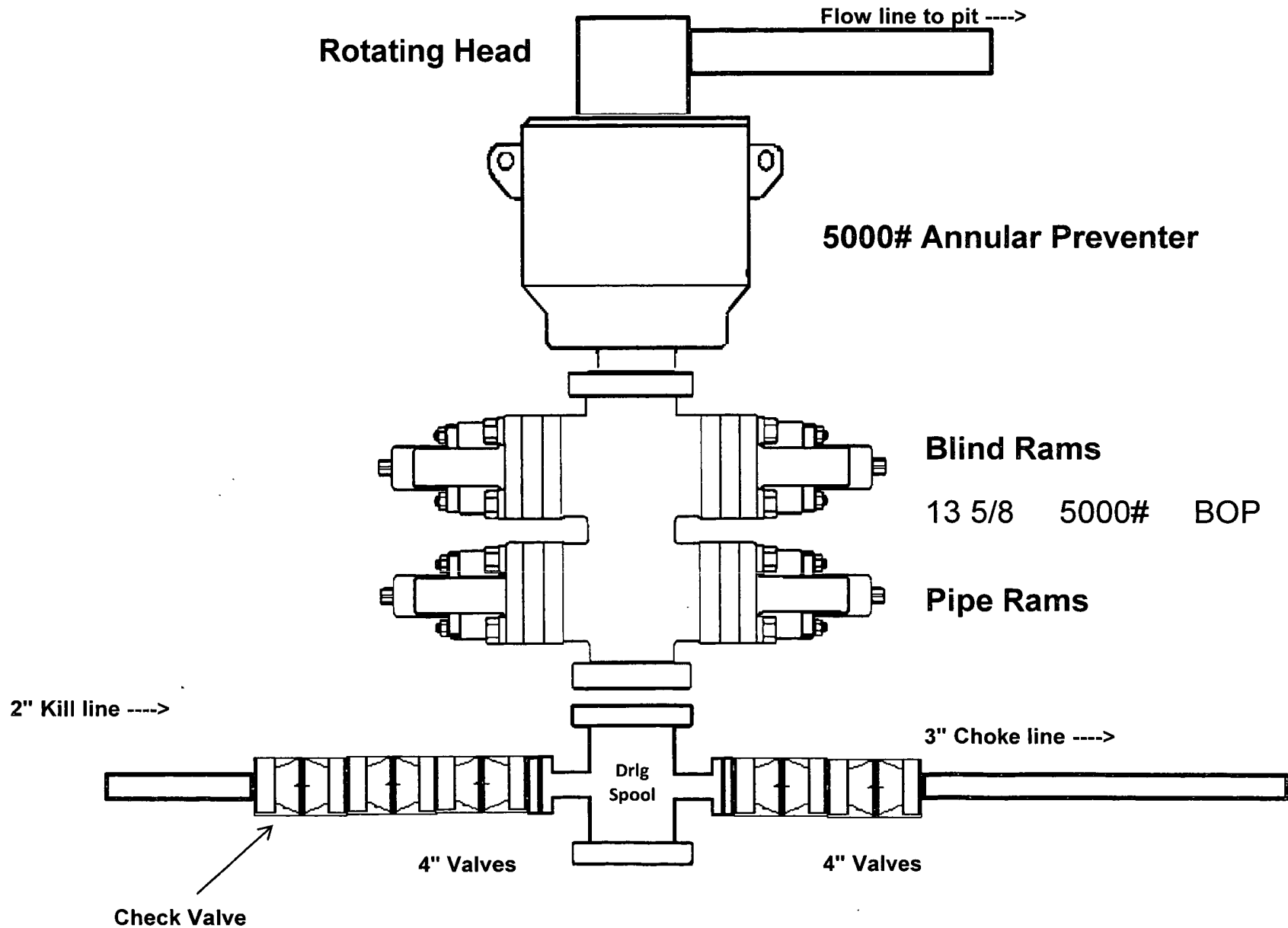
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Checked: _____ Date: _____

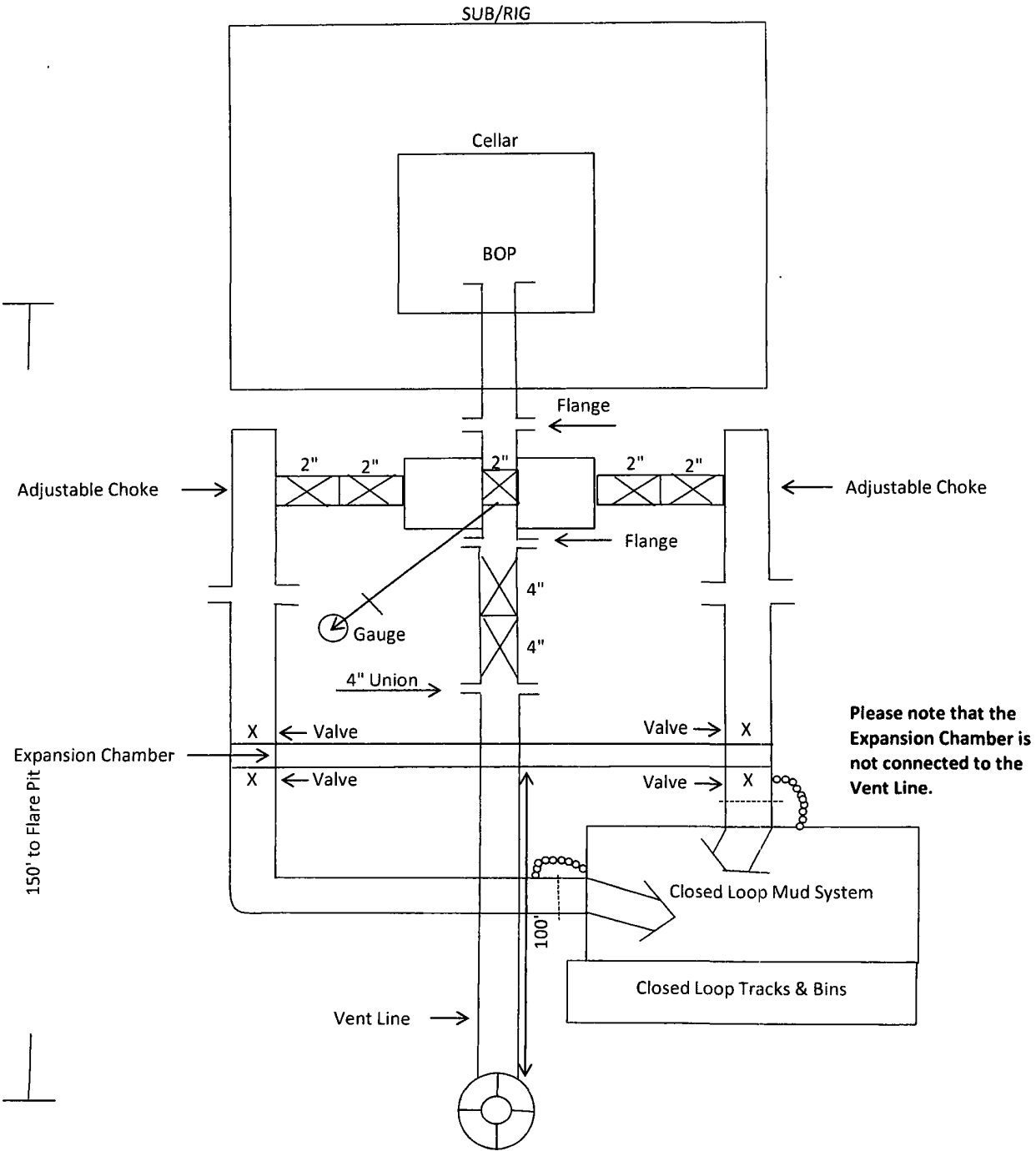
2,000 psi BOP Schematic



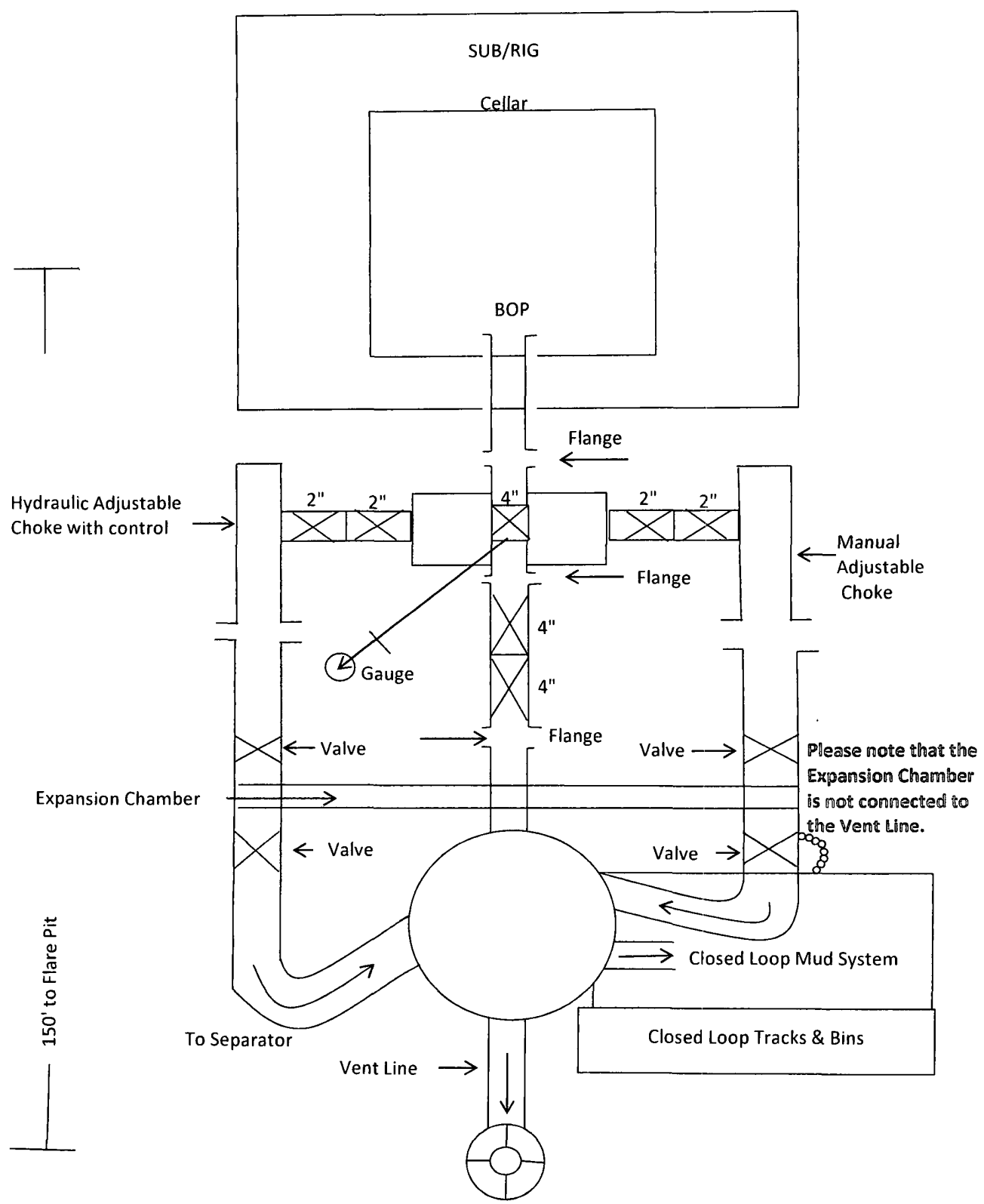
5,000 psi BOP Schematic



2M Choke Manifold Equipment



5M Choke Manifold Equipment



5,000 PSI CHOKE MANIFOLD

