

OCD-HOBBS

FORM APPROVED
OMB No. 1004-013
Expires July 31, 2010UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

HOBBS OCD

OCT 05 2011

APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of Work: ☒ DRILL ☐ REENTER		7. If Unit or CA Agreement, Name and No.	
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		8. Lease Name and Well No. <38864> Airacuda 31 Federal #2H	
2. Name of Operator COG Operating LLC. <229137>		9. API Well No. 30-025-40407	
3a. Address 2208 West Main Street Artesia, NM 88210	3b. Phone No. (include area code) 575-748-6940	10. Field and Pool, or Exploratory <83604> RED HILLS Wildcat, Wolfcamp Gas	
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 330' FNL & 1980' FEL Unit Letter B (NWNE) SHL Unit B At proposed prod. Zone 660 330' FSL & 1980' FEL Unit Letter O (SWSE) BHL Unit O		11. Sec., T.R.M. or Blk and Survey or Area Sec. 31 - T25S - R33E	
14. Distance in miles and direction from nearest town or post office* About 24 miles from Jal		12. County or Parish Lea County	13. State NM
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any) 330'	16. No. of acres in lease 440.2	17. Spacing Unit dedicated to this well 160	
18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. About 3000'	19. Proposed Depth HTD. 14200' TVD. 12500' MD: 1692	20. BLM/BIA Bond No. on file NMB00215	
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3401.7	22. Approximate date work will start* ASAP	23. Estimated duration 45 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 3/22/2011
Title Regulatory Analyst		
Approved by (Signature) <i>/s/ Don Peterson</i>	Name (Printed/Typed) <i>/s/ Don Peterson</i>	Date OCT 05 2011
Title FIELD MANAGER		
Office CARLSBAD FIELD OFFICE		

Application approval does not warrant or certify that the applicant holds legan 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 APPROVALAPPROVAL SUBJECT TO
GENERAL REQUIREMENTS
AND SPECIAL STIPULATIONS
ATTACHED

JAN 2-4 2012

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: March 21, 2011

Lease #: NMNM122620
Airacuda 31 Federal #2H

Legal Description: Sec. 31 – T25S – R33E
Lea County, New Mexico

Formation(s): Bone Springs

Bond Coverage: Statewide

BLM Bond File #: NMB00215 + NMB000740

COG OPERATING LLC

Mayte Reyes
Mayte Reyes
Regulatory Analyst

COG Operating LLC
DRILLING AND OPERATIONS PROGRAM
Airacuda 31 Federal #2H
SHL: 330' FNL & 1980' FEL
BHL: 330' FSL & 1980' FEL
Section 31 T25S R31E
Lea County, New Mexico

HOBBS OGD

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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	~390'	
Rustler	950'	
Top of Salt	1280'	
Base of Salt	4700'	
Delaware	4890'	Oil
Bone Spring	9060'	
1 st BSS	10,000'	Oil
2 nd BSS	10,525'	Oil
3 rd BSS	11,685'	Oil
Wolfcamp	12,115'	Oil/Gas
TD(Pilot)	14,200'	
TVD	12,500'	
TMD	16,920'	

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 950' and circulating cement back to surface. All intervals will be isolated by setting 7" and 4-1/2" casing to total depth and tying back cement to 200' into 9-5/8" casing.

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' - 950'	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#	STC	J-55	1.125	1.125	1.6
12 1/4"	3500' - 4800'	Intrmd	9 5/8"	New	40#	STC	J-55	1.125	1.125	1.6
8 3/4"	0' - 12,000'	2 nd Intrmd	7"	New	26#	LTC	P-110	1.125	1.125	1.6
6 1/8"	12,000' - 14,200'	Pilot Hole								
6 1/8"	11,700' - 16,920'	Liner	4 1/2"	New	11.6#	LTC	P-110	1.125	1.125	1.6

4. Proposed Cement Program:

- a. 13-3/8" Surface
Lead: 400 sx Class C + Gilsonite + HR-800
(12.7 ppg / 1.85 cuft/sx)
Tail: 250 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: 900 sx Class C + Gilsonite + HR-800
(12.7 ppg / 1.88 cuft/sx)
Tail: 250 sx Class C + 1% CaCl₂
(14.8 ppg / 1.35 cuft/sx)
**Calculated w/35% excess on OH volumes
- c. 7" 2nd Intermediate
Lead: 600 sx Class H + CFR-3 + Gilsonite + HR-800
(12.7 ppg / 1.89 cuft/sx)
Tail: 600 sx Class H + Halad-344 + CFR-3 + HR-800
(14.4 ppg / 1.25 cuft/sx)
**Calculated w/35% excess on OH volumes
- d. 4 1/2" Production Liner
Lead: 300 sx Class H + Acid Soluble
(15.0 ppg / 2.62 cuft/sx)
**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 7" Intermediate string TOC is designed to reach approximately 200' into 9-5/8" casing shoe.
 - After logging the PH, will plug back to kick off point by setting the following plugs:
- TD Plug f/PH TD – 14,000' See COA
50 sx Class H @ 15.6 ppg/1.18 ft³/sx + HR-800
Kick Off Plug f/12,000' – 12,500'
125 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 3M system tested to 3000# by independent tester.
Nipple up on 7" casing 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 3000 psi WP rating

6. Estimated BHP

- a. PH TD = 6160 psi
- b. Lateral TD = 5420 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' – 950'	Fresh Water	8.4	29	N.C.
950' – 4800'	Brine	10	29	N.C.
4800' – 12,000'	Cut Brine	9.0-9.4	29	N.C.
12,000' – 14,200' (PH)	Brine	10.0 – 10.6	29	N.C.
12,000' – 16,920' (Lateral)	Brine	10.0 – 10.6	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 4 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 4 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. Estimated BHP: 2100 psi. 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 45 days.



COG Operating LLC

Lea County(NAD83)

Airacuda 31 Federal

#2H

OH

HOBBS OCD

OCT 05 2011

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Plan: Design #1

Pathfinder X & Y Planning Report

10 March, 2011

PATHFINDER[®]

A Schlumberger Company



Pathfinder
Pathfinder X & Y Planning Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD83)
Site: Airacuda 31 Federal
Well: #2H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #2H
TVD Reference: RKB-20' @ 3421.70usft (Original Well Elev)
MD Reference: RKB-20' @ 3421.70usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Project	Lea 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	Airacuda 31 Federal		
Site Position:		Northing:	398,414.060 usft
From:	Map	Easting:	765,583.910 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 5' 35.700 N
		Longitude:	103° 36' 33.137 W
		Grid Convergence:	0.38 °

Well	#2H			
Well Position	+N/-S	0.00 usft	Northing:	398,414.060 usft
	+E/-W	0.00 usft	Easting:	765,583.910 usft
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft
			Latitude:	32° 5' 35.700 N
			Longitude:	103° 36' 33.137 W
			Ground Level:	3,401.70 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF200510	03/10/11	(°)	(°)	(nT)
			7.61	60.09	48,596

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	179.63

Survey Tool Program	Date	03/10/11		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	16,920.52	Design #1 (OH)	MWD	MWD - Standard



Pathfinder
Pathfinder X & Y Planning Report

PATHFINDER
A Schlumberger Company

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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	3,421.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
100.00	0.00	0.00	100.00	3,321.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
200.00	0.00	0.00	200.00	3,221.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
300.00	0.00	0.00	300.00	3,121.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
400.00	0.00	0.00	400.00	3,021.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
500.00	0.00	0.00	500.00	2,921.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
600.00	0.00	0.00	600.00	2,821.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
700.00	0.00	0.00	700.00	2,721.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
800.00	0.00	0.00	800.00	2,621.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
900.00	0.00	0.00	900.00	2,521.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
1,000.00	0.00	0.00	1,000.00	2,421.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
1,100.00	0.00	0.00	1,100.00	2,321.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
1,200.00	0.00	0.00	1,200.00	2,221.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
1,300.00	0.00	0.00	1,300.00	2,121.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
1,400.00	0.00	0.00	1,400.00	2,021.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
1,500.00	0.00	0.00	1,500.00	1,921.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
1,600.00	0.00	0.00	1,600.00	1,821.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
1,700.00	0.00	0.00	1,700.00	1,721.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
1,800.00	0.00	0.00	1,800.00	1,621.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
1,900.00	0.00	0.00	1,900.00	1,521.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
2,000.00	0.00	0.00	2,000.00	1,421.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
2,100.00	0.00	0.00	2,100.00	1,321.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
2,200.00	0.00	0.00	2,200.00	1,221.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
2,300.00	0.00	0.00	2,300.00	1,121.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
2,400.00	0.00	0.00	2,400.00	1,021.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
2,500.00	0.00	0.00	2,500.00	921.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
2,600.00	0.00	0.00	2,600.00	821.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91



Pathfinder
Pathfinder X & Y Planning Report



Company: COG Operating LLC
Project: Lea County(NAD83)
Site: Airacuda 31 Federal
Well: #2H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #2H
TVD Reference: RKB-20' @ 3421.70usft (Original Well Elev)
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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	721.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
2,800.00	0.00	0.00	2,800.00	621.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
2,900.00	0.00	0.00	2,900.00	521.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
3,000.00	0.00	0.00	3,000.00	421.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
3,100.00	0.00	0.00	3,100.00	321.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
3,200.00	0.00	0.00	3,200.00	221.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
3,300.00	0.00	0.00	3,300.00	121.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
3,400.00	0.00	0.00	3,400.00	21.70	0.00	0.00	0.00	0.00	398,414.06	765,583.91
3,500.00	0.00	0.00	3,500.00	-78.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
3,600.00	0.00	0.00	3,600.00	-178.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
3,700.00	0.00	0.00	3,700.00	-278.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
3,800.00	0.00	0.00	3,800.00	-378.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
3,900.00	0.00	0.00	3,900.00	-478.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
4,000.00	0.00	0.00	4,000.00	-578.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
4,100.00	0.00	0.00	4,100.00	-678.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
4,200.00	0.00	0.00	4,200.00	-778.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
4,300.00	0.00	0.00	4,300.00	-878.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
4,400.00	0.00	0.00	4,400.00	-978.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
4,500.00	0.00	0.00	4,500.00	-1,078.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
4,600.00	0.00	0.00	4,600.00	-1,178.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
4,700.00	0.00	0.00	4,700.00	-1,278.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
4,800.00	0.00	0.00	4,800.00	-1,378.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
4,900.00	0.00	0.00	4,900.00	-1,478.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
5,000.00	0.00	0.00	5,000.00	-1,578.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
5,100.00	0.00	0.00	5,100.00	-1,678.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
5,200.00	0.00	0.00	5,200.00	-1,778.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
5,300.00	0.00	0.00	5,300.00	-1,878.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91



Pathfinder
Pathfinder X & Y Planning Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD83)
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Planned Survey

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5,400.00	0.00	0.00	5,400.00	-1,978.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
5,500.00	0.00	0.00	5,500.00	-2,078.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
5,600.00	0.00	0.00	5,600.00	-2,178.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
5,700.00	0.00	0.00	5,700.00	-2,278.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
5,800.00	0.00	0.00	5,800.00	-2,378.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
5,900.00	0.00	0.00	5,900.00	-2,478.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
6,000.00	0.00	0.00	6,000.00	-2,578.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
6,100.00	0.00	0.00	6,100.00	-2,678.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
6,200.00	0.00	0.00	6,200.00	-2,778.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
6,300.00	0.00	0.00	6,300.00	-2,878.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
6,400.00	0.00	0.00	6,400.00	-2,978.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
6,500.00	0.00	0.00	6,500.00	-3,078.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
6,600.00	0.00	0.00	6,600.00	-3,178.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
6,700.00	0.00	0.00	6,700.00	-3,278.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
6,800.00	0.00	0.00	6,800.00	-3,378.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
6,900.00	0.00	0.00	6,900.00	-3,478.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
7,000.00	0.00	0.00	7,000.00	-3,578.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
7,100.00	0.00	0.00	7,100.00	-3,678.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
7,200.00	0.00	0.00	7,200.00	-3,778.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
7,300.00	0.00	0.00	7,300.00	-3,878.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
7,400.00	0.00	0.00	7,400.00	-3,978.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
7,500.00	0.00	0.00	7,500.00	-4,078.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
7,600.00	0.00	0.00	7,600.00	-4,178.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
7,700.00	0.00	0.00	7,700.00	-4,278.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
7,800.00	0.00	0.00	7,800.00	-4,378.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
7,900.00	0.00	0.00	7,900.00	-4,478.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
8,000.00	0.00	0.00	8,000.00	-4,578.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91



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PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD83)
Site: Airacuda 31 Federal
Well: #2H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #2H
TVD Reference: RKB-20' @ 3421.70usft (Original Well Elev)
MD Reference: RKB-20' @ 3421.70usft (Original Well Elev)
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)
8,100.00	0.00	0.00	8,100.00	-4,678.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
8,200.00	0.00	0.00	8,200.00	-4,778.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
8,300.00	0.00	0.00	8,300.00	-4,878.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
8,400.00	0.00	0.00	8,400.00	-4,978.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
8,500.00	0.00	0.00	8,500.00	-5,078.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
8,600.00	0.00	0.00	8,600.00	-5,178.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
8,700.00	0.00	0.00	8,700.00	-5,278.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
8,800.00	0.00	0.00	8,800.00	-5,378.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
8,900.00	0.00	0.00	8,900.00	-5,478.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
9,000.00	0.00	0.00	9,000.00	-5,578.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
9,100.00	0.00	0.00	9,100.00	-5,678.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
9,200.00	0.00	0.00	9,200.00	-5,778.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
9,300.00	0.00	0.00	9,300.00	-5,878.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
9,400.00	0.00	0.00	9,400.00	-5,978.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
9,500.00	0.00	0.00	9,500.00	-6,078.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
9,600.00	0.00	0.00	9,600.00	-6,178.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
9,700.00	0.00	0.00	9,700.00	-6,278.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
9,800.00	0.00	0.00	9,800.00	-6,378.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
9,900.00	0.00	0.00	9,900.00	-6,478.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
10,000.00	0.00	0.00	10,000.00	-6,578.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
10,100.00	0.00	0.00	10,100.00	-6,678.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
10,200.00	0.00	0.00	10,200.00	-6,778.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
10,300.00	0.00	0.00	10,300.00	-6,878.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
10,400.00	0.00	0.00	10,400.00	-6,978.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
10,500.00	0.00	0.00	10,500.00	-7,078.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
10,600.00	0.00	0.00	10,600.00	-7,178.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
10,700.00	0.00	0.00	10,700.00	-7,278.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91



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Site: Airacuda 31 Federal
Well: #2H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference:
TVD Reference:
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North Reference:
Survey Calculation Method:
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Well #2H
RKB-20' @ 3421.70usft (Original Well Elev)
RKB-20' @ 3421.70usft (Original Well Elev)
Grid
Minimum Curvature
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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)
10,800.00	0.00	0.00	10,800.00	-7,378.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
10,900.00	0.00	0.00	10,900.00	-7,478.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
11,000.00	0.00	0.00	11,000.00	-7,578.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
11,100.00	0.00	0.00	11,100.00	-7,678.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
11,200.00	0.00	0.00	11,200.00	-7,778.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
11,300.00	0.00	0.00	11,300.00	-7,878.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
11,400.00	0.00	0.00	11,400.00	-7,978.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
11,500.00	0.00	0.00	11,500.00	-8,078.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
11,600.00	0.00	0.00	11,600.00	-8,178.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
11,700.00	0.00	0.00	11,700.00	-8,278.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
11,800.00	0.00	0.00	11,800.00	-8,378.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
11,900.00	0.00	0.00	11,900.00	-8,478.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
12,000.00	0.00	0.00	12,000.00	-8,578.30	0.00	0.00	0.00	0.00	398,414.06	765,583.91
12,022.54	0.00	0.00	12,022.54	-8,600.84	0.00	0.00	0.00	0.00	398,414.06	765,583.91
KOP-12022.54°MD,0.00°INC,0.00°AZI,12022.54°TVD										
12,025.00	0.30	179.63	12,025.00	-8,603.30	-0.01	0.00	0.01	12.00	398,414.05	765,583.91
12,050.00	3.30	179.63	12,049.98	-8,628.28	-0.79	0.01	0.79	12.00	398,413.27	765,583.92
12,075.00	6.30	179.63	12,074.89	-8,653.19	-2.88	0.02	2.88	12.00	398,411.18	765,583.93
12,100.00	9.30	179.63	12,099.66	-8,677.96	-6.27	0.04	6.27	12.00	398,407.79	765,583.95
12,125.00	12.30	179.63	12,124.22	-8,702.52	-10.95	0.07	10.95	12.00	398,403.11	765,583.98
12,150.00	15.30	179.63	12,148.49	-8,726.79	-16.91	0.11	16.91	12.00	398,397.15	765,584.02
12,175.00	18.30	179.63	12,172.42	-8,750.72	-24.13	0.16	24.13	12.00	398,389.93	765,584.07
12,200.00	21.30	179.63	12,195.94	-8,774.24	-32.60	0.21	32.60	12.00	398,381.46	765,584.12
12,225.00	24.30	179.63	12,218.99	-8,797.29	-42.28	0.27	42.29	12.00	398,371.78	765,584.18
12,250.00	27.30	179.63	12,241.49	-8,819.79	-53.16	0.34	53.16	12.00	398,360.90	765,584.25
12,275.00	30.30	179.63	12,263.40	-8,841.70	-65.20	0.42	65.20	12.00	398,348.86	765,584.33
12,300.00	33.30	179.63	12,284.65	-8,862.95	-78.37	0.51	78.37	12.00	398,335.69	765,584.42



Pathfinder
Pathfinder X & Y Planning Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD83)
Site: Airacuda 31 Federal
Well: #2H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:
Well #2H:
RKB-20' @ 3421.70usft (Original Well Elev)
RKB-20' @ 3421.70usft (Original Well Elev)
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)
12,325.00	36.30	179.63	12,305.17	-8,883.47	-92.64	0.60	92.64	12.00	398,321.42	765,584.51
12,350.00	39.30	179.63	12,324.93	-8,903.23	-107.96	0.70	107.96	12.00	398,306.10	765,584.61
12,375.00	42.30	179.63	12,343.85	-8,922.15	-124.29	0.80	124.29	12.00	398,289.77	765,584.71
12,400.00	45.30	179.63	12,361.89	-8,940.19	-141.59	0.91	141.59	12.00	398,272.47	765,584.82
12,425.00	48.30	179.63	12,379.01	-8,957.31	-159.81	1.03	159.81	12.00	398,254.25	765,584.94
12,450.00	51.30	179.63	12,395.14	-8,973.44	-178.90	1.16	178.90	12.00	398,235.16	765,585.07
12,475.00	54.30	179.63	12,410.26	-8,988.56	-198.81	1.28	198.81	12.00	398,215.25	765,585.19
12,500.00	57.30	179.63	12,424.31	-9,002.61	-219.48	1.42	219.49	12.00	398,194.58	765,585.33
12,525.00	60.30	179.63	12,437.26	-9,015.56	-240.86	1.56	240.87	12.00	398,173.20	765,585.47
12,550.00	63.30	179.63	12,449.08	-9,027.38	-262.89	1.70	262.90	12.00	398,151.17	765,585.61
12,575.00	66.30	179.63	12,459.72	-9,038.02	-285.51	1.84	285.51	12.00	398,128.55	765,585.75
12,600.00	69.30	179.63	12,469.17	-9,047.47	-308.65	1.99	308.66	12.00	398,105.41	765,585.90
12,625.00	72.30	179.63	12,477.39	-9,055.69	-332.25	2.15	332.26	12.00	398,081.81	765,586.06
12,650.00	75.30	179.63	12,484.37	-9,062.67	-356.26	2.30	356.27	12.00	398,057.80	765,586.21
12,675.00	78.30	179.63	12,490.08	-9,068.38	-380.59	2.46	380.60	12.00	398,033.47	765,586.37
12,700.00	81.30	179.63	12,494.51	-9,072.81	-405.20	2.62	405.20	12.00	398,008.86	765,586.53
12,725.00	84.30	179.63	12,497.64	-9,075.94	-429.99	2.78	430.00	12.00	397,984.07	765,586.69
12,750.00	87.30	179.63	12,499.47	-9,077.77	-454.92	2.94	454.93	12.00	397,959.14	765,586.85
12,772.54	90.00	179.63	12,500.00	-9,078.30	-477.45	3.08	477.46	12.00	397,936.61	765,586.99
EOC-12772.54°MD,90.00°INC,179.63°AZI,12500.00°TVD										
12,800.00	90.00	179.63	12,500.00	-9,078.30	-504.91	3.26	504.92	0.00	397,909.15	765,587.17
12,900.00	90.00	179.63	12,500.00	-9,078.30	-604.91	3.91	604.92	0.00	397,809.15	765,587.82
13,000.00	90.00	179.63	12,500.00	-9,078.30	-704.91	4.55	704.92	0.00	397,709.15	765,588.46
13,100.00	90.00	179.63	12,500.00	-9,078.30	-804.91	5.20	804.92	0.00	397,609.15	765,589.11
13,200.00	90.00	179.63	12,500.00	-9,078.30	-904.91	5.84	904.92	0.00	397,509.15	765,589.75
13,300.00	90.00	179.63	12,500.00	-9,078.30	-1,004.90	6.49	1,004.92	0.00	397,409.16	765,590.40
13,400.00	90.00	179.63	12,500.00	-9,078.30	-1,104.90	7.14	1,104.92	0.00	397,309.16	765,591.05



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MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
13,500.00	90.00	179.63	12,500.00	-9,078.30	-1,204.90	7.78	1,204.92	0.00	397,209.16	765,591.69
13,600.00	90.00	179.63	12,500.00	-9,078.30	-1,304.90	8.43	1,304.92	0.00	397,109.16	765,592.34
13,700.00	90.00	179.63	12,500.00	-9,078.30	-1,404.90	9.07	1,404.92	0.00	397,009.16	765,592.98
13,800.00	90.00	179.63	12,500.00	-9,078.30	-1,504.89	9.72	1,504.92	0.00	396,909.17	765,593.63
13,900.00	90.00	179.63	12,500.00	-9,078.30	-1,604.89	10.36	1,604.92	0.00	396,809.17	765,594.27
14,000.00	90.00	179.63	12,500.00	-9,078.30	-1,704.89	11.01	1,704.92	0.00	396,709.17	765,594.92
14,100.00	90.00	179.63	12,500.00	-9,078.30	-1,804.89	11.66	1,804.92	0.00	396,609.17	765,595.57
14,200.00	90.00	179.63	12,500.00	-9,078.30	-1,904.89	12.30	1,904.92	0.00	396,509.17	765,596.21
14,300.00	90.00	179.63	12,500.00	-9,078.30	-2,004.88	12.95	2,004.92	0.00	396,409.18	765,596.86
14,400.00	90.00	179.63	12,500.00	-9,078.30	-2,104.88	13.59	2,104.92	0.00	396,309.18	765,597.50
14,500.00	90.00	179.63	12,500.00	-9,078.30	-2,204.88	14.24	2,204.92	0.00	396,209.18	765,598.15
14,600.00	90.00	179.63	12,500.00	-9,078.30	-2,304.88	14.88	2,304.92	0.00	396,109.18	765,598.79
14,700.00	90.00	179.63	12,500.00	-9,078.30	-2,404.87	15.53	2,404.92	0.00	396,009.19	765,599.44
14,800.00	90.00	179.63	12,500.00	-9,078.30	-2,504.87	16.18	2,504.92	0.00	395,909.19	765,600.09
14,900.00	90.00	179.63	12,500.00	-9,078.30	-2,604.87	16.82	2,604.92	0.00	395,809.19	765,600.73
15,000.00	90.00	179.63	12,500.00	-9,078.30	-2,704.87	17.47	2,704.92	0.00	395,709.19	765,601.38
15,100.00	90.00	179.63	12,500.00	-9,078.30	-2,804.87	18.11	2,804.92	0.00	395,609.19	765,602.02
15,200.00	90.00	179.63	12,500.00	-9,078.30	-2,904.86	18.76	2,904.92	0.00	395,509.20	765,602.67
15,300.00	90.00	179.63	12,500.00	-9,078.30	-3,004.86	19.40	3,004.92	0.00	395,409.20	765,603.31
15,400.00	90.00	179.63	12,500.00	-9,078.30	-3,104.86	20.05	3,104.92	0.00	395,309.20	765,603.96
15,500.00	90.00	179.63	12,500.00	-9,078.30	-3,204.86	20.70	3,204.92	0.00	395,209.20	765,604.61
15,600.00	90.00	179.63	12,500.00	-9,078.30	-3,304.86	21.34	3,304.92	0.00	395,109.20	765,605.25
15,700.00	90.00	179.63	12,500.00	-9,078.30	-3,404.85	21.99	3,404.92	0.00	395,009.21	765,605.90
15,800.00	90.00	179.63	12,500.00	-9,078.30	-3,504.85	22.63	3,504.92	0.00	394,909.21	765,606.54
15,900.00	90.00	179.63	12,500.00	-9,078.30	-3,604.85	23.28	3,604.92	0.00	394,809.21	765,607.19
16,000.00	90.00	179.63	12,500.00	-9,078.30	-3,704.85	23.93	3,704.92	0.00	394,709.21	765,607.84
16,100.00	90.00	179.63	12,500.00	-9,078.30	-3,804.85	24.57	3,804.92	0.00	394,609.21	765,608.48



Pathfinder
Pathfinder X & Y Planning Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD83)
Site: Airacuda 31 Federal
Well: #2H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: VWell #2H
TVD Reference: RKB-20' @ 3421.70usft (Original Well Elev)
MD Reference: RKB-20' @ 3421.70usft (Original Well Elev)
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)
16,200.00	90.00	179.63	12,500.00	-9,078.30	-3,904.84	25.22	3,904.92	0.00	394,509.22	765,609.13
16,300.00	90.00	179.63	12,500.00	-9,078.30	-4,004.84	25.86	4,004.92	0.00	394,409.22	765,609.77
16,400.00	90.00	179.63	12,500.00	-9,078.30	-4,104.84	26.51	4,104.92	0.00	394,309.22	765,610.42
16,500.00	90.00	179.63	12,500.00	-9,078.30	-4,204.84	27.15	4,204.92	0.00	394,209.22	765,611.06
16,600.00	90.00	179.63	12,500.00	-9,078.30	-4,304.84	27.80	4,304.92	0.00	394,109.22	765,611.71
16,700.00	90.00	179.63	12,500.00	-9,078.30	-4,404.83	28.45	4,404.92	0.00	394,009.23	765,612.36
16,800.00	90.00	179.63	12,500.00	-9,078.30	-4,504.83	29.09	4,504.92	0.00	393,909.23	765,613.00
16,900.00	90.00	179.63	12,500.00	-9,078.30	-4,604.83	29.74	4,604.92	0.00	393,809.23	765,613.65
16,920.52	90.00	179.63	12,500.00	-9,078.30	-4,625.35	29.87	4,625.45	0.00	393,788.71	765,613.78

TD at 16920.52

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
12,022.54	12,022.54	0.00	0.00	KOP-12022.54'MD,0.00°INC,0.00°AZI,12022.54'TVD
12,772.54	12,500.00	-477.45	3.08	EOC-12772.54'MD,90.00°INC,179.63°AZI,12500.00'TVD
16,920.52	12,500.00	-4,625.35	29.87	TD at 16920.52

Checked By: _____ Approved By: _____ Date: _____



Project: Lea County(NAD83)
Site: Airacuda 31 Feder:
Well: #2H
Wellbore: OH
Plan: Design #1 (#2H/OH)



Azimuths to Grid North
True North: -0.39°
Magnetic North: 7.23°

Magnetic Field
Strength: 48595.6snT
Dip Angle: 60.09°
Date: 03/10/2011
Model: IGRF200510

PATHFINDER
A Schlumberger Company

PROJECT DETAILS: Lea County(NAD83)
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Eastern Zone
System Datum: Mean Sea Level
Local North: Grid

SECTION DETAILS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
12022.54	0.00	0.00	12022.54	0.00	0.00	0.00	0.00	0.00	
12772.54	90.00	179.63	12500.00	-477.45	3.08	12.00	179.63	477.46	
46920.52	90.00	179.63	12500.00	-4625.35	29.87	0.00	0.00	4625.45	BHL (Airacuda31#2H)

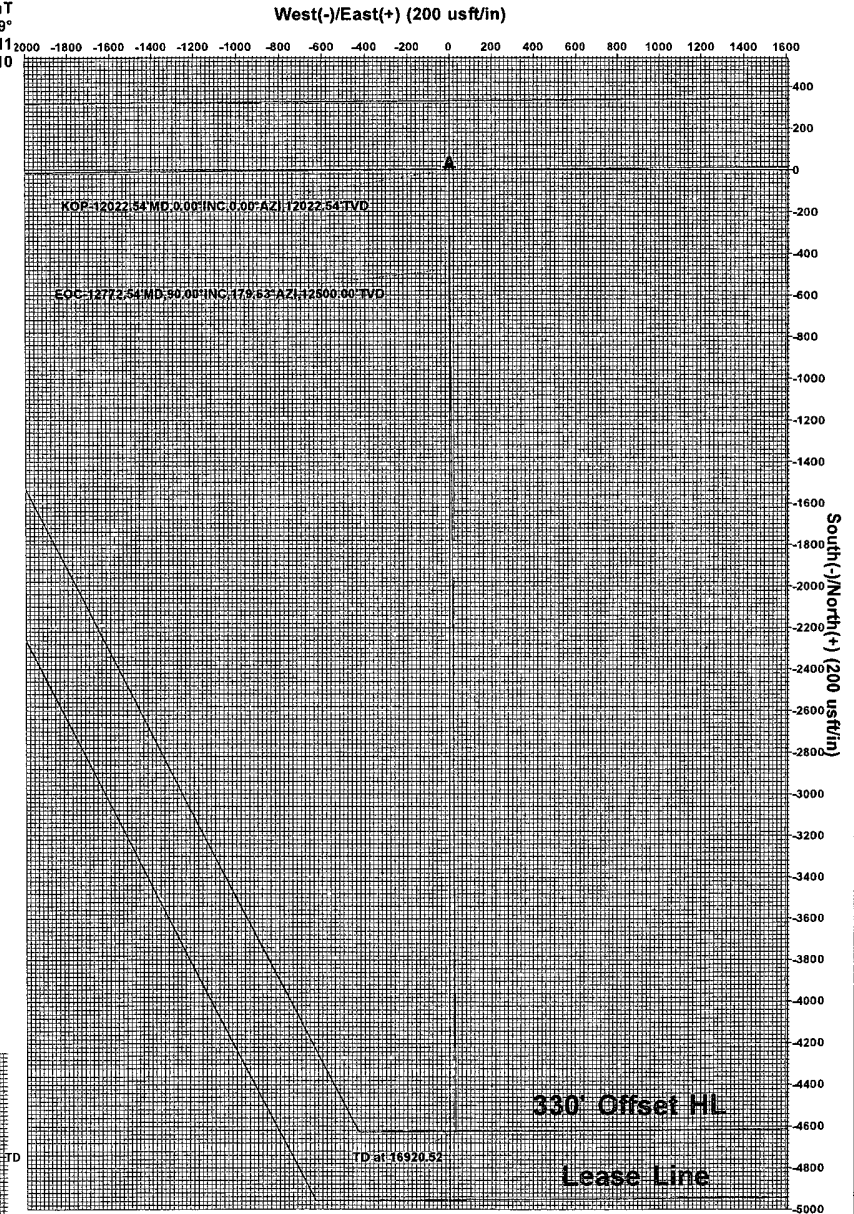
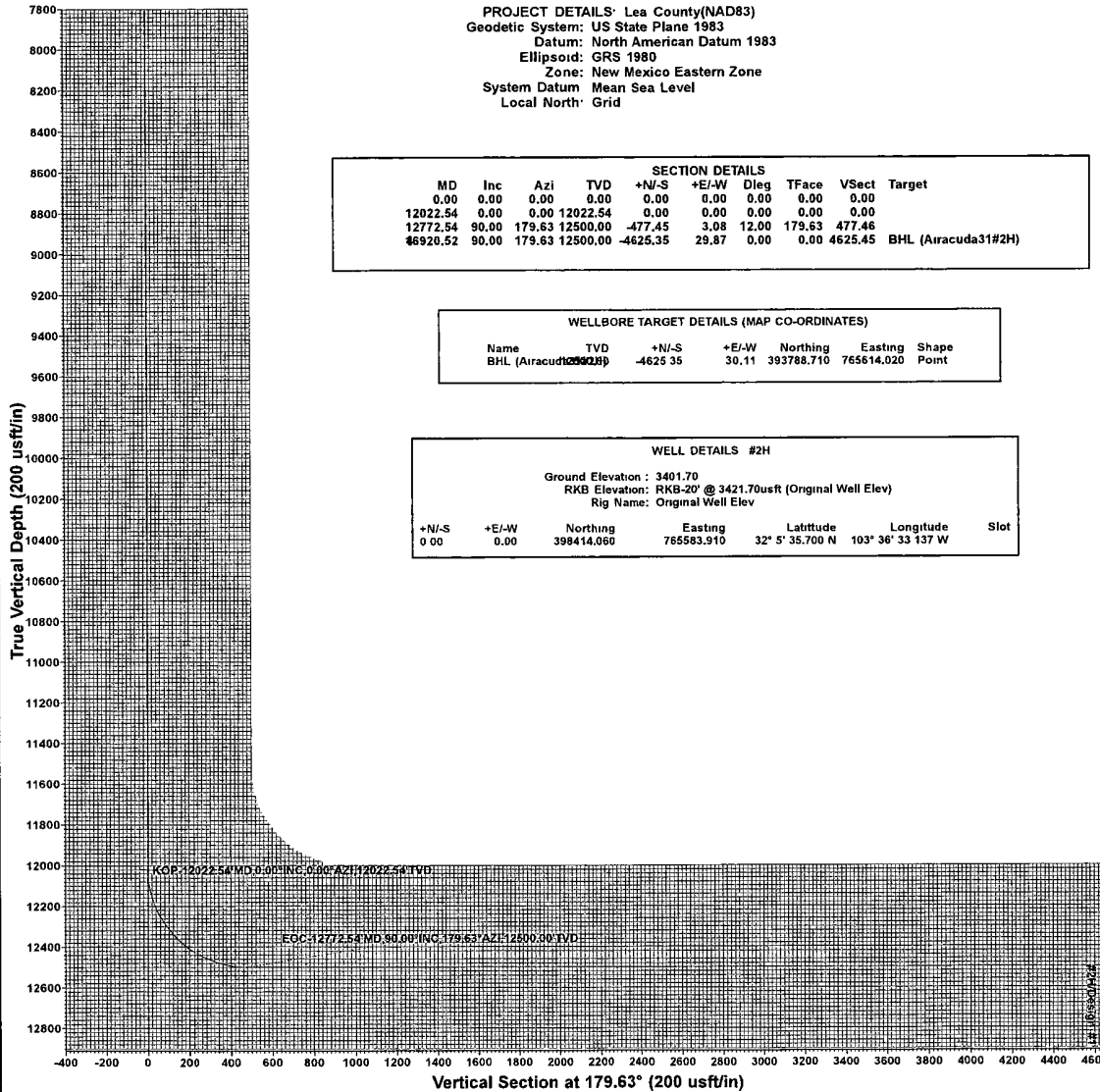
WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
BHL (Airacuda31#2H)	12500.00	-4625.35	30.11	393788.710	765614.020	Point

WELL DETAILS #2H

Ground Elevation: 3401.70
RKB Elevation: RKB-20' @ 3421.70usft (Original Well Elev)
Rig Name: Original Well Elev

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	398414.060	765583.910	32° 5' 35.700 N	103° 36' 33.137 W	

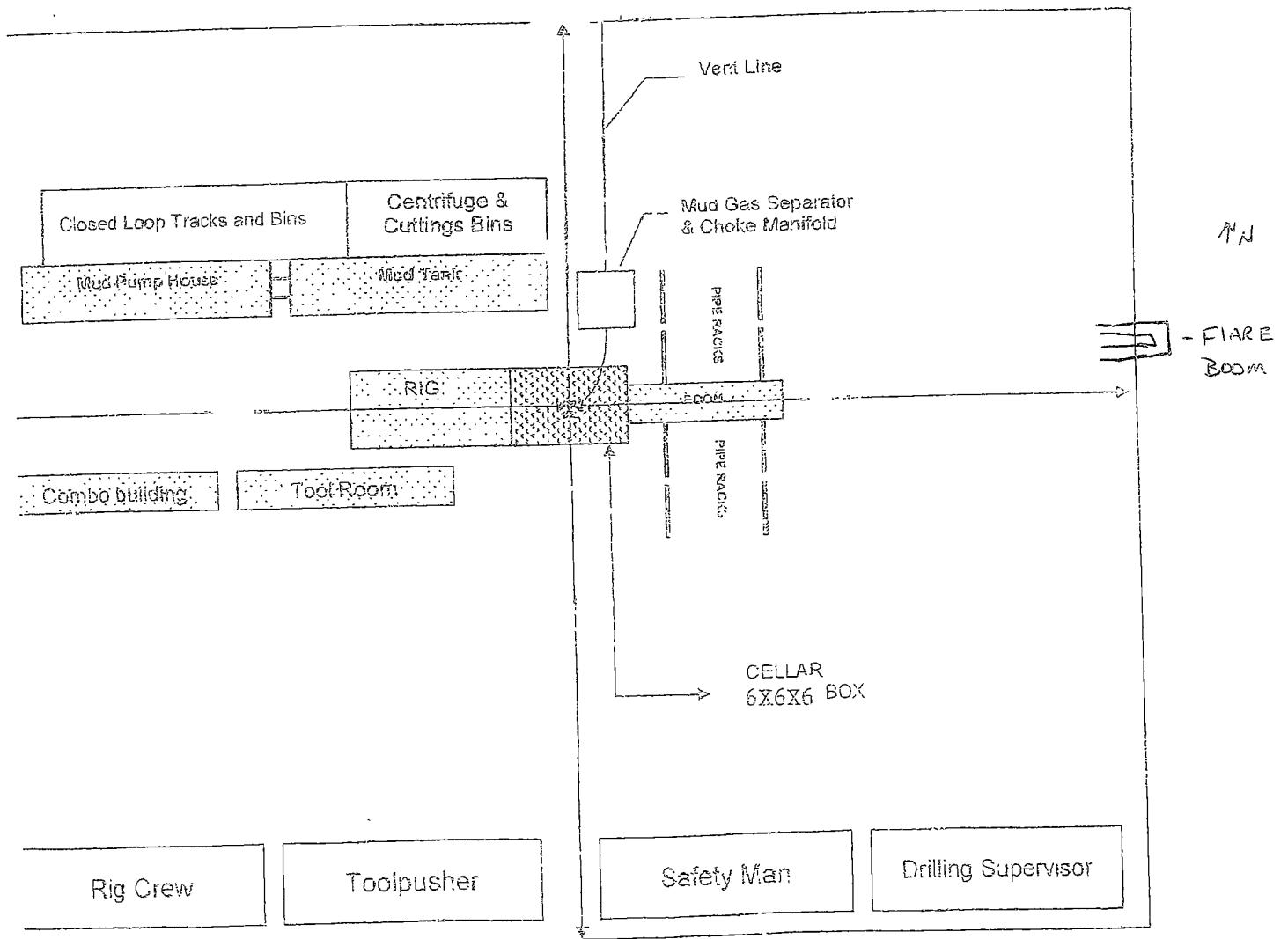


Plan: Design #1 (#2H/OH)

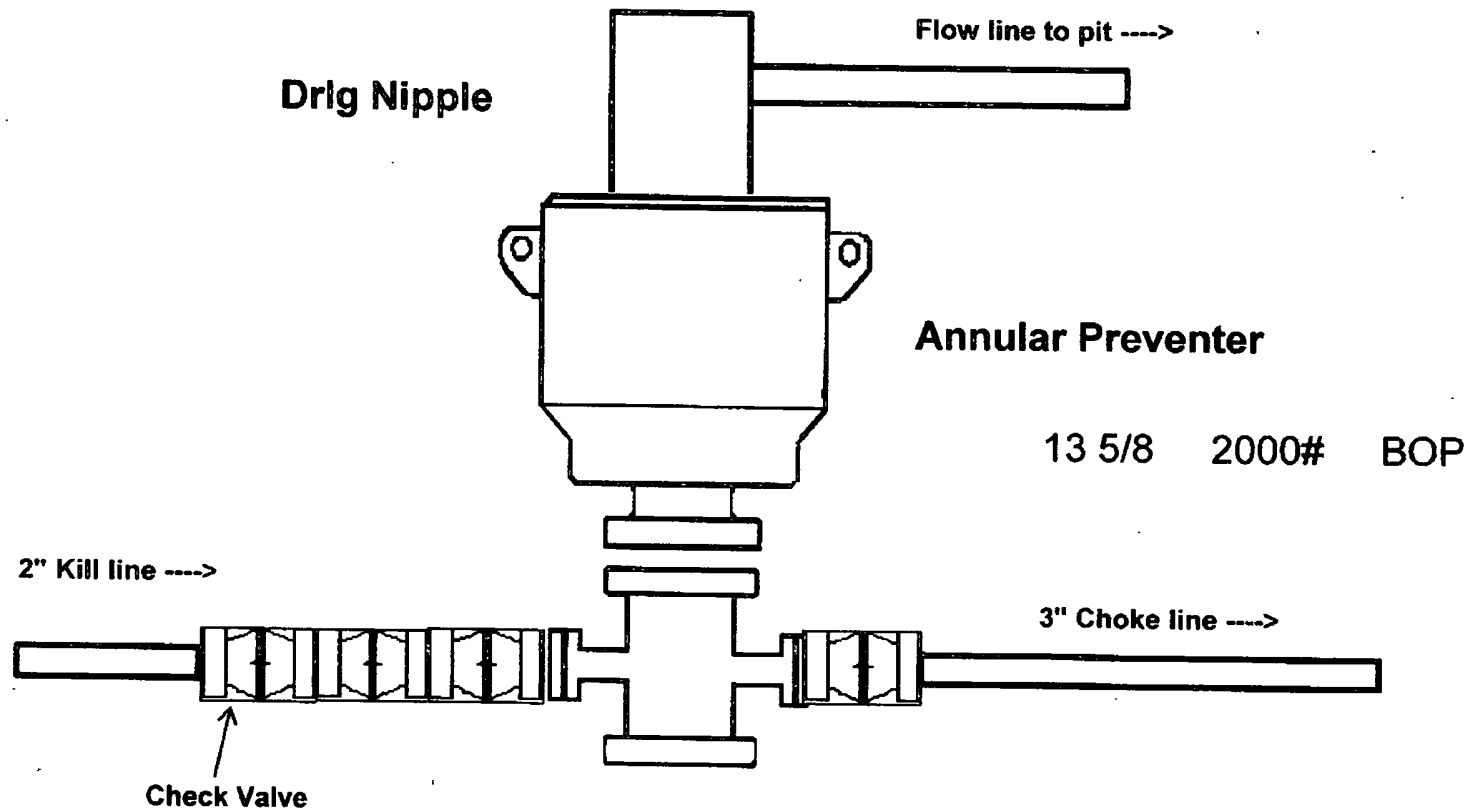
Created By: Nate Bingham Date: 14 45, March 10 2011

Checked: _____ Date: _____

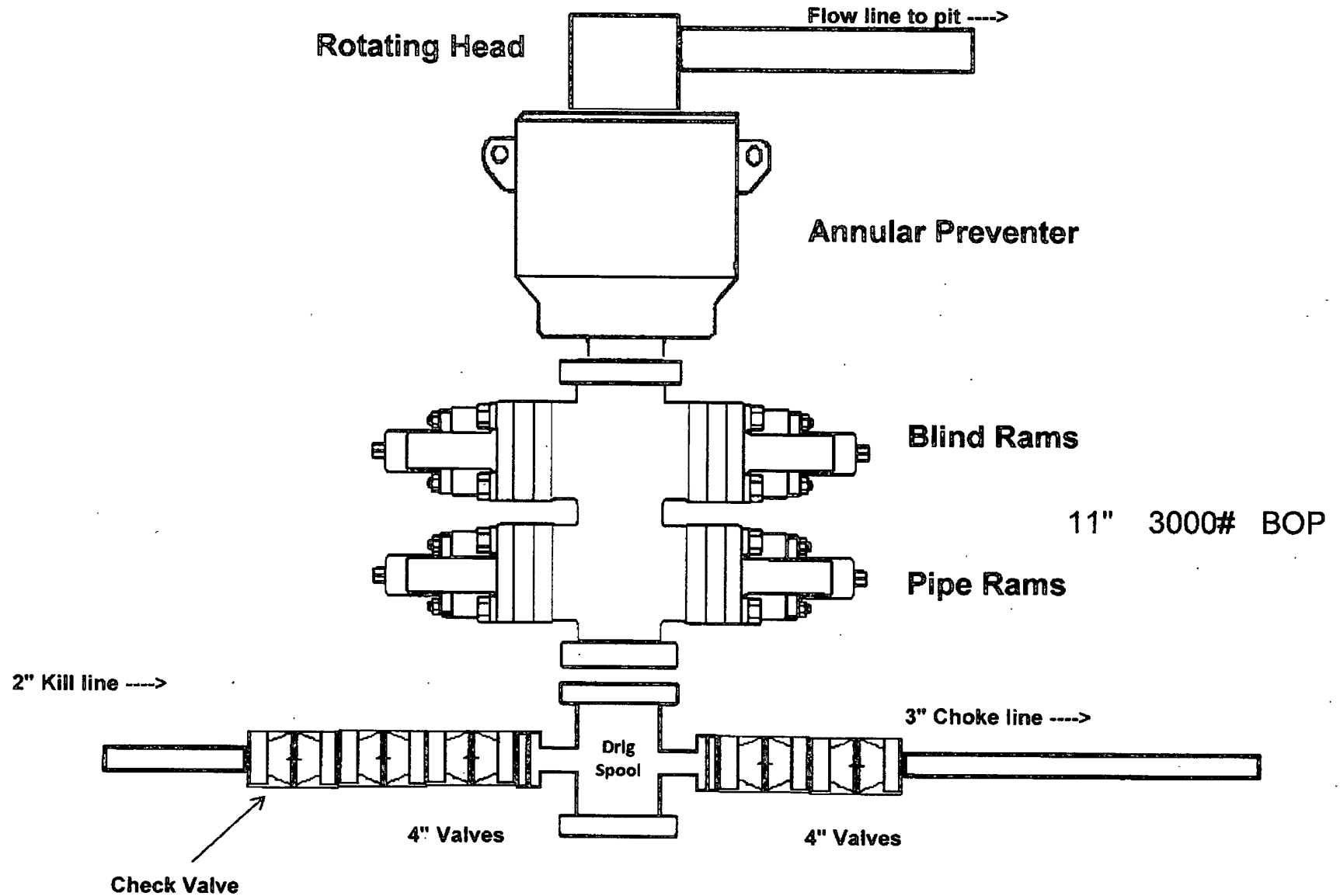
3M Choke Manifold Equipment



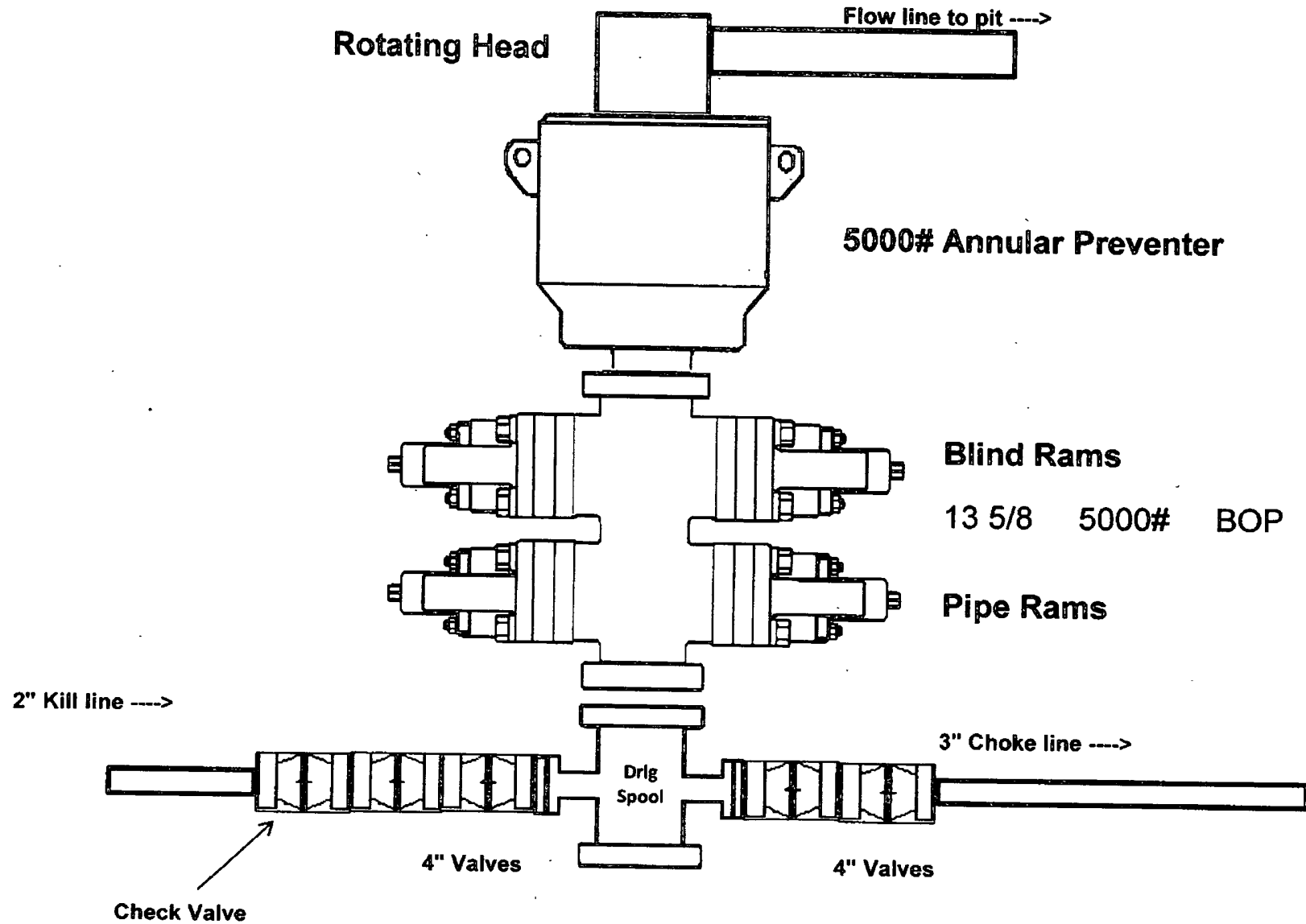
2,000 psi BOP Schematic



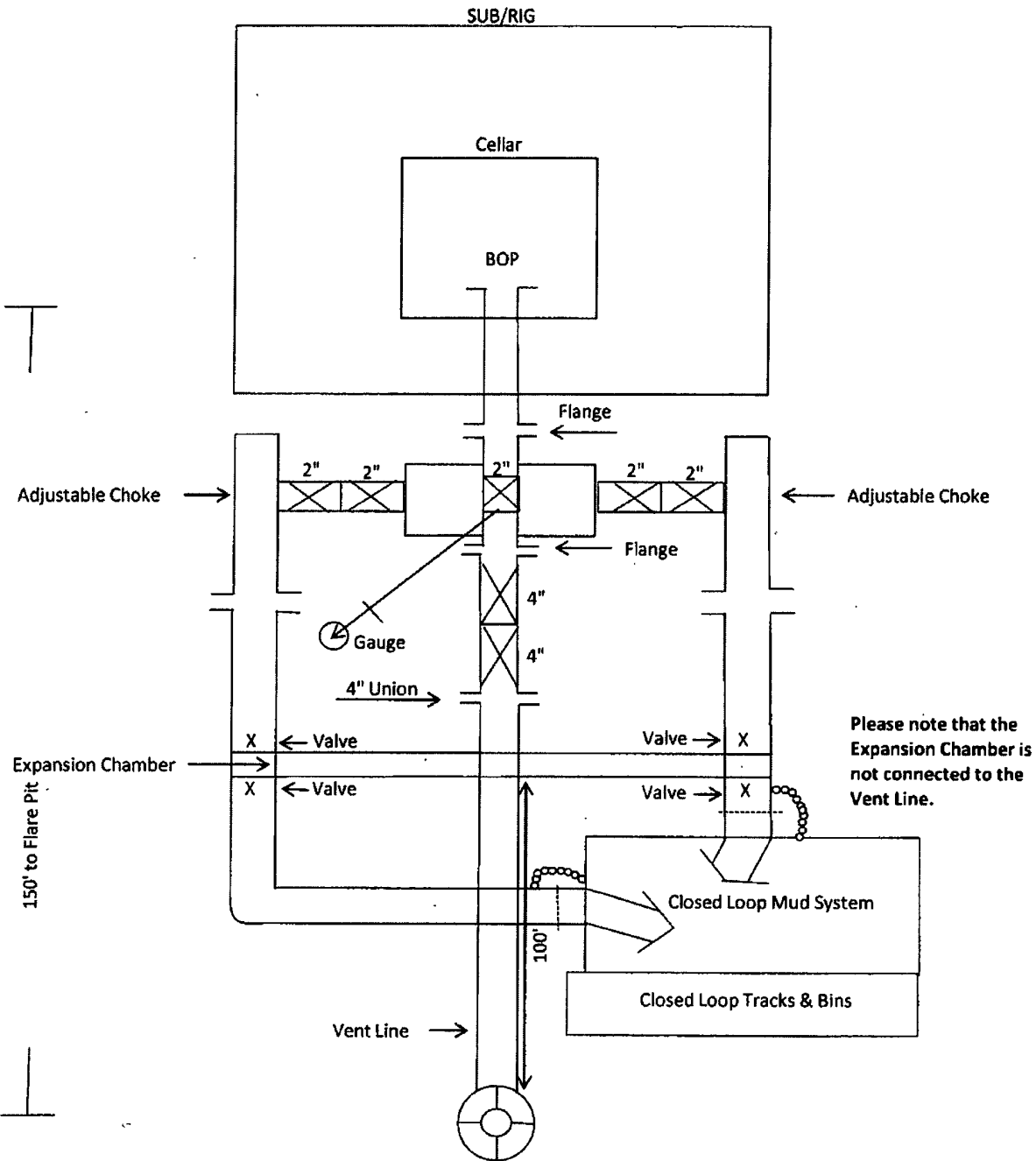
3,000 psi BOP Schematic



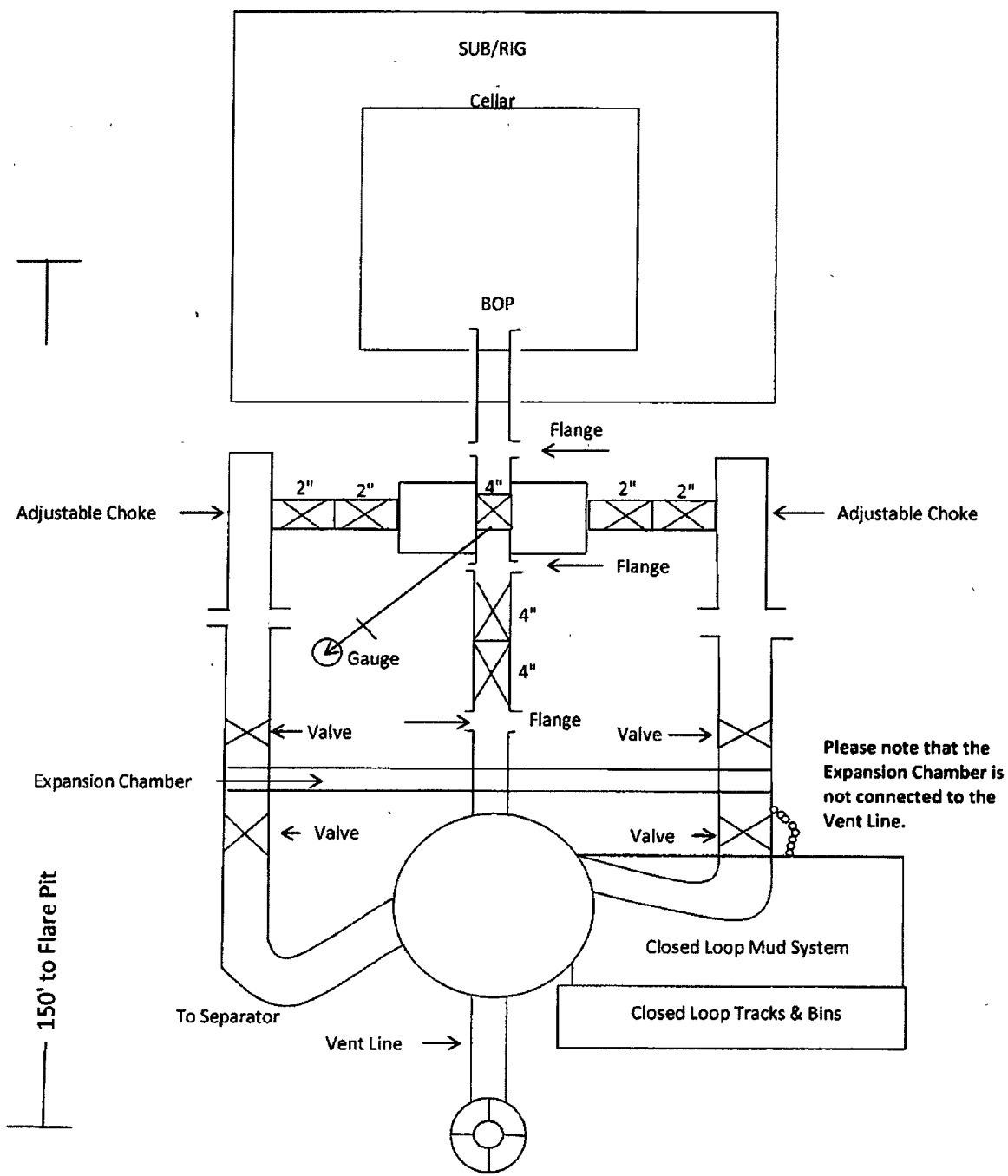
5,000 psi BOP Schematic



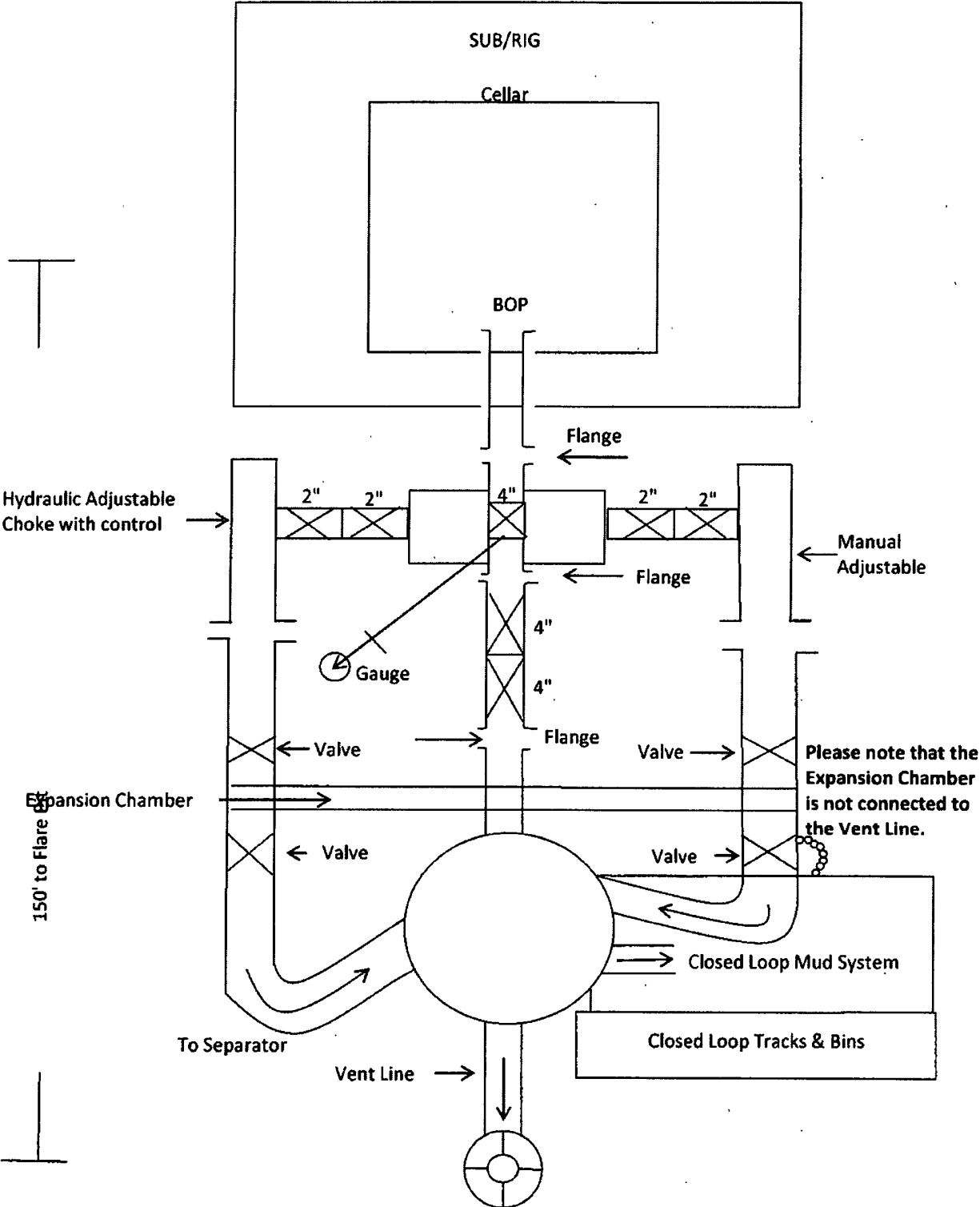
2M Choke Manifold Equipment



3M Choke Manifold Equipment



5M Choke Manifold Equipment



5,000 PSI CHOKE MANIFOLD

