

OCD-HOBBS

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

HOBBS OCD

JUL 31 2012

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of Work: ☒ DRILL ☐ REENTER		7. If Unit or CA Agreement, Name and No. Lusk Deep Unit - NMNM70982X	
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		8. Lease Name and Well No. <308161> Lusk Deep Unit A #22H	
2. Name of Operator COG Operating LLC. <229137>		9. API Well No. 30-025-40705	
3a. Address 2208 West Main Street Artesia, NM 88210	3b. Phone No. (include area code) 575-748-6940	10. Field and Pool, or Exploratory 41440 Lusk ; Bone Spring West	
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 330' FNL & 1650' FWL Unit Letter C (NENW) SHL At proposed prod. Zone 330' FSL & 1980' FWL Unit Letter N (SESW) BHL		11. Sec., T.R.M. or Blk and Survey or Area Sec. 17 - T19S - R32E	
14. Distance in miles and direction from nearest town or post office* About 12 miles from Maljamar		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 NM036100: 160. NM001087: 280 NM001088: 120	17. Spacing Unit dedicated to this well 160	
18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. 330'	19. Proposed Depth TVD: 9280' MD: 13648'	20. BLM/BIA Bond No. on file NMB000740	
21. Elevations (Show whether OF, KDB, RT, GL, etc.) 3610'	22. Approximate date work will start* 6/20/2012	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 5/10/2012
-------------------------------------	-------------------------------------	-------------------

Regulatory Analyst	
Approved by (Signature) <i>/s/ James A. Amos</i>	Name (Printed/Typed) JUL 27 2012
Title FIELD-MANAGER	Office CARLSBAD FIELD OFFICE

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Conditions of approval, if any, are attached.

APPROVAL FOR TWO YEARS

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

(Continued on page 2)

*(Instructions on page 2)

Approval Subject to General Requirements
& Special Stipulations Attached

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

AUG 02 2012

KZ 08/01/12 Capitan Controlled Water Basin

COG Operating LLC
DRILLING AND OPERATIONS PROGRAM

Lusk Deep Unit A Com #22H

SHL: 330' FNL & 1650' FWL

BHL: 330' FSL & 1980' FWL

Section 17 T19S 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	~ 100'	
Rustler	742'	
Top of Salt	837'	
Base of Salt	2383'	
Yates	2637'	
7 Rivers	2821'	
Reef	2900'	
Delaware	4602'	Oil
Bone Spring	7032'	Oil
TD TVD	9280'	
TD MD	13,648'	

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 775' 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 <i>See CoA</i>	Section	OD Casing	New/Used	Wt	Collar	Grade	Collapse Design Factor	Burst Design Factor	Tension Design Factor
17 1/2"	0' - 775' 940'	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' - 4550'	Intrmd	9 5/8"	New	40#	BTC	J-55	1.125	1.125	1.6
7 7/8"	0' - 13,648'	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

See
COA

Lead: 300 sx Class C + 4% Gel + 2% CaCl₂
(13.5 ppg / 1.75 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

See
COA

1st Stg:

Lead: 300 sx 35:65:6 C+Salt+Gilsonite+CFR-3+ HR601
(12.7 ppg / 1.89 cuft/sx)

Tail: 250 sx Class C + 1% CaCl₂
(14.8 ppg / 1.35 cuft/sx)

2nd Stg: DVT/ECP @ +/- 2800'

Lead: 550 sx Class C + 4% Gel + 2% CaCl₂
(13.5 ppg / 1.75 cuft/sx)

Tail: 100 sx Class C + 2% CaCl₂
(14.8 ppg / 1.35 cuft/sx)

**Calculated w/35% excess on OH volumes

d. 5 1/2" Production

Lead: 600 sx 35:65:6 H + Salt+Gilsonite+CFR-3+ HR601
(11.8 ppg / 2.5 cuft/sx)

Tail: 950 sx 50:50:2 H +Salt+GasStop +HR601 +CFR-3
(14.4 ppg / 1.25 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 is designed to circulate to surface.
- The production string will at least tie back 500' into 9-5/8" shoe

5. Minimum Specifications for Pressure Control:

Nipple up on 13 3/8 with annular preventer tested to 50% of rating working pressure by independent tester and the rest of the 2M system tested to 2000 psi.

Nipple up on 9 5/8 with 3M system tested 3000 psi to 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 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.

6. Estimated BHP:

Lateral TD = 4025 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' - 775' 940	Fresh Water	8.4	29	N.C.
775' - 4550'	Brine	10	29	N.C.
4550' - 13,648' (Lateral)	Cut Brine	8.9 - 9.2	29	N.C.

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

8. Auxiliary Well Control and Monitoring Equipment:

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

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

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

10. Potential Hazards:

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

11. Anticipated starting date and Duration of Operations:

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



Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #22H
Wellbore: OH
Plan: Plan #1 (#22H/OH)



Azimuths to Grid North
True North: -0.29°
Magnetic North: 7.31°

Magnetic Field
Strength: 48806.9snT
Dip Angle: 60.56°
Date: 5/8/2012
Model: IGRF200510

PATHFINDER®

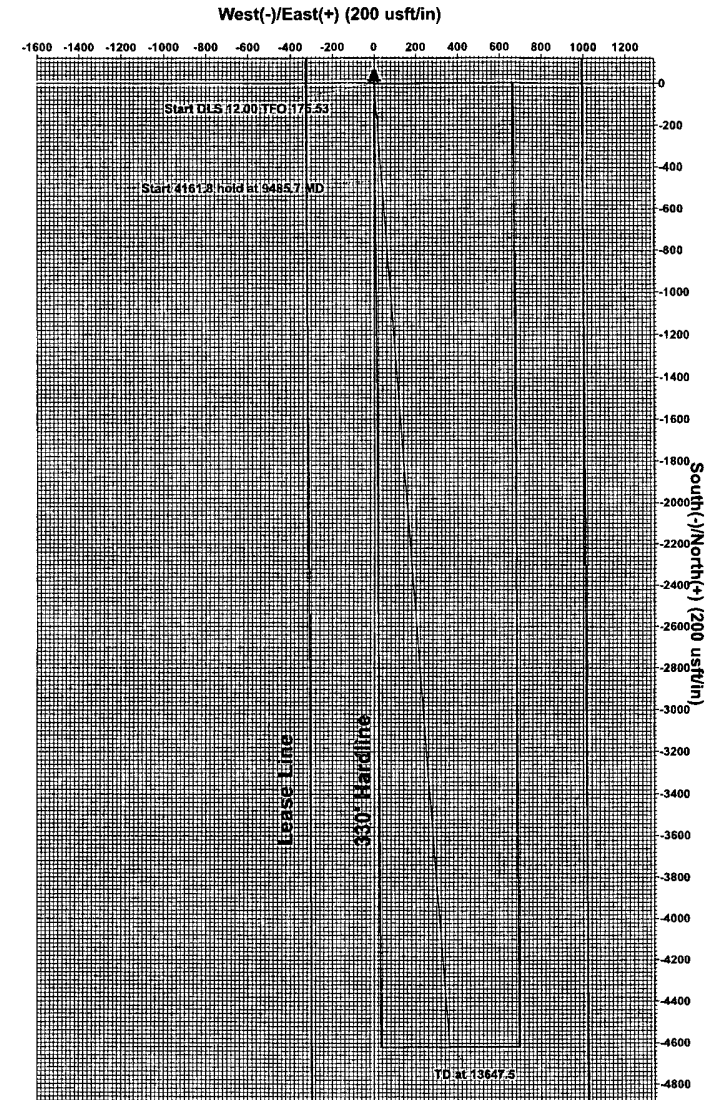
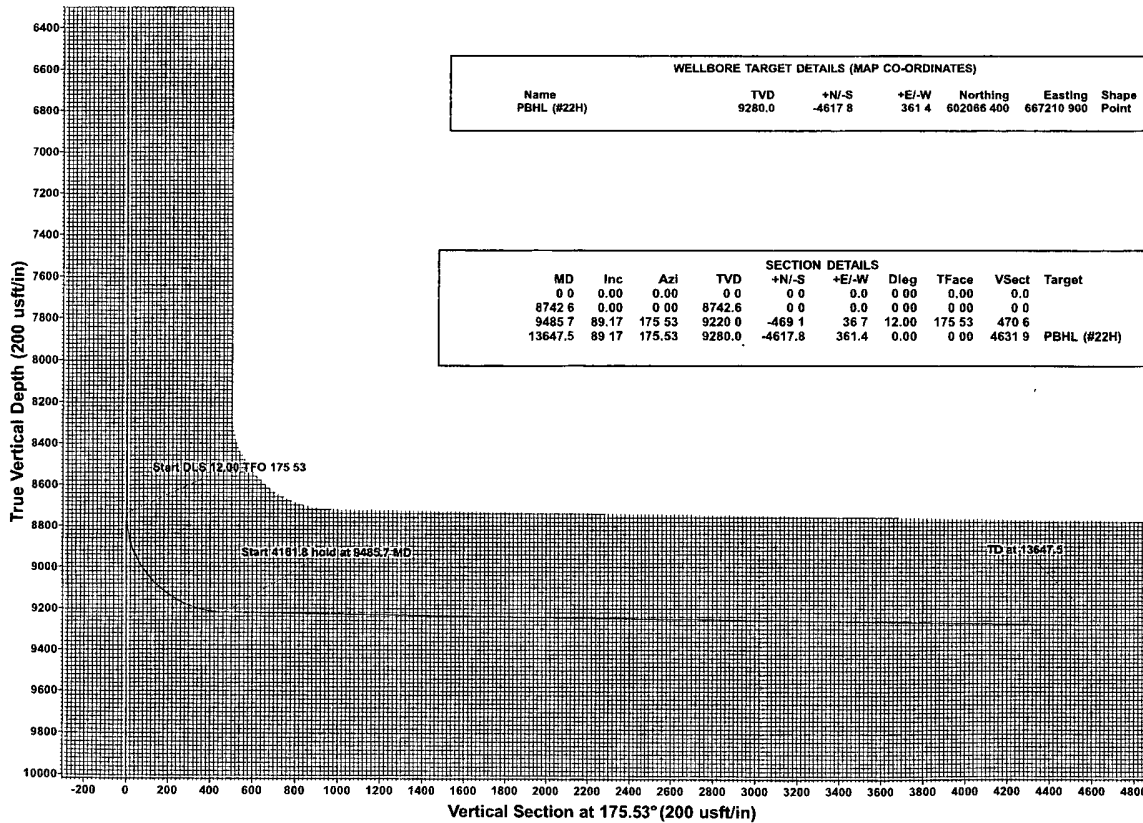
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PROJECT DETAILS: Lea County(NAD27)
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid

WELL DETAILS #22H						
Ground Elevation: 3610.0						
RKB Elevation: KB = 17' @ 3627.0usft (Original Well Elev)						
Rig Name: Original Well Elev						
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	606684.200	666649.500	32.667	-103.791	

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
PBHL (#22H)	9280.0	-4617.8	361.4	602066.400	667210.900	Point

SECTION DETAILS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
8742.6	0.00	0.00	8742.6	0.0	0.0	0.00	0.00	0.0	
9485.7	89.17	175.53	9220.0	-469.1	36.7	12.00	175.53	470.6	
13647.5	89.17	175.53	9280.0	-4617.8	361.4	0.00	0.00	4631.9	PBHL (#22H)



Plan Plan #1 (#22H/OH)			
Created By	Michael Trout	Date	14 51, May 08 2012
Checked		Date	

COG Operating LLC
Lea County(NAD27)
Lusk Deep Unit A
Well: #22H
Original Well Elev
OH
Plan #1



COG Operating LLC

Lea County(NAD27)

Lusk Deep Unit A

#22H

OH

Plan: Plan #1

Pathfinder X & Y Report

08 May, 2012

PATHFINDER[®]
A Schlumberger Company



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #22H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #22H
TVD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
MD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

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

Site	Lusk Deep Unit A		
Site Position:		Northing:	599,927.400 usft
From: Map		Easting:	665,577.000 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32.648
		Longitude:	-103.795
		Grid Convergence:	0.29 °

Well	#22H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32.667
		Longitude:	-103.791
		Ground Level:	3,610.0 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	IGRF200510	5/8/2012	(°)
			7.60
			Dip Angle
			(°)
			60.56
			Field Strength
			(nT)
			48,807

Design	Plan #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			175.53

Survey Tool Program	Date	5/8/2012		
From	To			
(usft)	(usft)	Survey (Wellbore)	Tool Name	Description
0.0	13,647.4	Plan #1 (OH)		



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #22H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #22H
TVD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
MD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
North Reference: Grd
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
0.0	0.00	0.00	0.0	-3,627.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
100.0	0.00	0.00	100.0	-3,527.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
200.0	0.00	0.00	200.0	-3,427.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
300.0	0.00	0.00	300.0	-3,327.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
400.0	0.00	0.00	400.0	-3,227.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
500.0	0.00	0.00	500.0	-3,127.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
600.0	0.00	0.00	600.0	-3,027.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
700.0	0.00	0.00	700.0	-2,927.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
800.0	0.00	0.00	800.0	-2,827.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
900.0	0.00	0.00	900.0	-2,727.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
1,000.0	0.00	0.00	1,000.0	-2,627.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
1,100.0	0.00	0.00	1,100.0	-2,527.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
1,200.0	0.00	0.00	1,200.0	-2,427.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
1,300.0	0.00	0.00	1,300.0	-2,327.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
1,400.0	0.00	0.00	1,400.0	-2,227.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
1,500.0	0.00	0.00	1,500.0	-2,127.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
1,600.0	0.00	0.00	1,600.0	-2,027.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
1,700.0	0.00	0.00	1,700.0	-1,927.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
1,800.0	0.00	0.00	1,800.0	-1,827.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
1,900.0	0.00	0.00	1,900.0	-1,727.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
2,000.0	0.00	0.00	2,000.0	-1,627.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
2,100.0	0.00	0.00	2,100.0	-1,527.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
2,200.0	0.00	0.00	2,200.0	-1,427.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
2,300.0	0.00	0.00	2,300.0	-1,327.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
2,400.0	0.00	0.00	2,400.0	-1,227.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
2,500.0	0.00	0.00	2,500.0	-1,127.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
2,600.0	0.00	0.00	2,600.0	-1,027.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #22H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #22H
TVD Reference: KB = 17' @ 3627 0usft (Original Well Elev)
MD Reference: KB = 17' @ 3627 0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
2,700.0	0.00	0.00	2,700.0	-927.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
2,800.0	0.00	0.00	2,800.0	-827.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
2,900.0	0.00	0.00	2,900.0	-727.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
3,000.0	0.00	0.00	3,000.0	-627.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
3,100.0	0.00	0.00	3,100.0	-527.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
3,200.0	0.00	0.00	3,200.0	-427.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
3,300.0	0.00	0.00	3,300.0	-327.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
3,400.0	0.00	0.00	3,400.0	-227.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
3,500.0	0.00	0.00	3,500.0	-127.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
3,600.0	0.00	0.00	3,600.0	-27.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
3,700.0	0.00	0.00	3,700.0	73.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
3,800.0	0.00	0.00	3,800.0	173.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
3,900.0	0.00	0.00	3,900.0	273.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
4,000.0	0.00	0.00	4,000.0	373.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
4,100.0	0.00	0.00	4,100.0	473.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
4,200.0	0.00	0.00	4,200.0	573.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
4,300.0	0.00	0.00	4,300.0	673.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
4,400.0	0.00	0.00	4,400.0	773.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
4,500.0	0.00	0.00	4,500.0	873.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
4,600.0	0.00	0.00	4,600.0	973.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
4,700.0	0.00	0.00	4,700.0	1,073.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
4,800.0	0.00	0.00	4,800.0	1,173.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
4,900.0	0.00	0.00	4,900.0	1,273.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
5,000.0	0.00	0.00	5,000.0	1,373.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
5,100.0	0.00	0.00	5,100.0	1,473.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
5,200.0	0.00	0.00	5,200.0	1,573.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
5,300.0	0.00	0.00	5,300.0	1,673.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #22H
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Design: Plan #1

Local Co-ordinate Reference: Well #22H
TVD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
MD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
5,400.0	0.00	0.00	5,400.0	1,773.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
5,500.0	0.00	0.00	5,500.0	1,873.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
5,600.0	0.00	0.00	5,600.0	1,973.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
5,700.0	0.00	0.00	5,700.0	2,073.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
5,800.0	0.00	0.00	5,800.0	2,173.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
5,900.0	0.00	0.00	5,900.0	2,273.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
6,000.0	0.00	0.00	6,000.0	2,373.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
6,100.0	0.00	0.00	6,100.0	2,473.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
6,200.0	0.00	0.00	6,200.0	2,573.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
6,300.0	0.00	0.00	6,300.0	2,673.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
6,400.0	0.00	0.00	6,400.0	2,773.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
6,500.0	0.00	0.00	6,500.0	2,873.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
6,600.0	0.00	0.00	6,600.0	2,973.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
6,700.0	0.00	0.00	6,700.0	3,073.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
6,800.0	0.00	0.00	6,800.0	3,173.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
6,900.0	0.00	0.00	6,900.0	3,273.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
7,000.0	0.00	0.00	7,000.0	3,373.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
7,100.0	0.00	0.00	7,100.0	3,473.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
7,200.0	0.00	0.00	7,200.0	3,573.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
7,300.0	0.00	0.00	7,300.0	3,673.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
7,400.0	0.00	0.00	7,400.0	3,773.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
7,500.0	0.00	0.00	7,500.0	3,873.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
7,600.0	0.00	0.00	7,600.0	3,973.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
7,700.0	0.00	0.00	7,700.0	4,073.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
7,800.0	0.00	0.00	7,800.0	4,173.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
7,900.0	0.00	0.00	7,900.0	4,273.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50
8,000.0	0.00	0.00	8,000.0	4,373.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #22H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #22H
TVD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
MD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
8,100.0	0.00	0.00	8,100.0	4,473.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50	
8,200.0	0.00	0.00	8,200.0	4,573.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50	
8,300.0	0.00	0.00	8,300.0	4,673.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50	
8,400.0	0.00	0.00	8,400.0	4,773.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50	
8,500.0	0.00	0.00	8,500.0	4,873.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50	
8,600.0	0.00	0.00	8,600.0	4,973.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50	
8,700.0	0.00	0.00	8,700.0	5,073.0	0.0	0.0	0.0	0.00	606,684.20	666,849.50	
8,742.6	0.00	0.00	8,742.6	5,115.6	0.0	0.0	0.0	0.00	606,684.20	666,849.50	
8,750.0	0.89	175.53	8,750.0	5,123.0	-0.1	0.0	0.1	12.00	606,684.14	666,849.50	
8,775.0	3.89	175.53	8,775.0	5,148.0	-1.1	0.1	1.1	12.00	606,683.10	666,849.59	
8,800.0	6.89	175.53	8,799.9	5,172.9	-3.4	0.3	3.4	12.00	606,680.76	666,849.77	
8,825.0	9.89	175.53	8,824.6	5,197.6	-7.1	0.6	7.1	12.00	606,677.13	666,850.05	
8,850.0	12.89	175.53	8,849.1	5,222.1	-12.0	0.9	12.0	12.00	606,672.21	666,850.44	
8,875.0	15.89	175.53	8,873.3	5,246.3	-18.2	1.4	18.2	12.00	606,666.02	666,850.92	
8,900.0	18.89	175.53	8,897.2	5,270.2	-25.6	2.0	25.7	12.00	606,658.57	666,851.51	
8,925.0	21.89	175.53	8,920.6	5,293.6	-34.3	2.7	34.4	12.00	606,649.89	666,852.19	
8,950.0	24.89	175.53	8,943.5	5,316.5	-44.2	3.5	44.3	12.00	606,639.99	666,852.96	
8,975.0	27.89	175.53	8,965.9	5,338.9	-55.3	4.3	55.5	12.00	606,628.92	666,853.83	
9,000.0	30.89	175.53	8,987.7	5,360.7	-67.5	5.3	67.7	12.00	606,616.69	666,854.78	
9,025.0	33.89	175.53	9,008.8	5,381.8	-80.9	6.3	81.1	12.00	606,603.34	666,855.83	
9,050.0	36.89	175.53	9,029.2	5,402.2	-95.3	7.5	95.6	12.00	606,588.91	666,856.96	
9,075.0	39.89	175.53	9,048.8	5,421.8	-110.8	8.7	111.1	12.00	606,573.43	666,858.17	
9,100.0	42.89	175.53	9,067.5	5,440.5	-127.2	10.0	127.6	12.00	606,556.96	666,859.46	
9,125.0	45.89	175.53	9,085.4	5,458.4	-144.7	11.3	145.1	12.00	606,539.52	666,860.82	
9,150.0	48.89	175.53	9,102.3	5,475.3	-163.0	12.8	163.5	12.00	606,521.18	666,862.26	
9,175.0	51.89	175.53	9,118.3	5,491.3	-182.2	14.3	182.8	12.00	606,501.98	666,863.76	
9,200.0	54.89	175.53	9,133.2	5,506.2	-202.2	15.8	202.8	12.00	606,481.98	666,865.33	



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #22H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #22H
TVD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
MD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
9,225.0	57.89	175.53	9,147.0	5,520.0	-223.0	17.5	223.7	12.00	606,461.23	666,866.95
9,250.0	60.89	175.53	9,159.7	5,532.7	-244.4	19.1	245.2	12.00	606,439.78	666,868.63
9,275.0	63.89	175.53	9,171.3	5,544.3	-266.5	20.9	267.3	12.00	606,417.70	666,870.36
9,300.0	66.89	175.53	9,181.7	5,554.7	-289.2	22.6	290.0	12.00	606,395.04	666,872.13
9,325.0	69.89	175.53	9,191.0	5,564.0	-312.3	24.4	313.3	12.00	606,371.87	666,873.94
9,350.0	72.89	175.53	9,198.9	5,571.9	-335.9	26.3	337.0	12.00	606,348.25	666,875.79
9,375.0	75.89	175.53	9,205.7	5,578.7	-359.9	28.2	361.1	12.00	606,324.25	666,877.67
9,400.0	78.89	175.53	9,211.1	5,584.1	-384.3	30.1	385.4	12.00	606,299.93	666,879.57
9,425.0	81.89	175.53	9,215.3	5,588.3	-408.8	32.0	410.1	12.00	606,275.36	666,881.50
9,450.0	84.89	175.53	9,218.2	5,591.2	-433.6	33.9	434.9	12.00	606,250.60	666,883.43
9,475.0	87.89	175.53	9,219.7	5,592.7	-458.5	35.9	459.9	12.00	606,225.73	666,885.38
9,485.7	89.17	175.53	9,220.0	5,593.0	-469.1	36.7	470.6	12.00	606,215.05	666,886.22
9,500.0	89.17	175.53	9,220.2	5,593.2	-483.4	37.8	484.9	0.00	606,200.81	666,887.33
9,600.0	89.17	175.53	9,221.7	5,594.7	-583.1	45.6	584.9	0.00	606,101.13	666,895.13
9,700.0	89.17	175.53	9,223.1	5,596.1	-682.8	53.4	684.8	0.00	606,001.44	666,902.93
9,800.0	89.17	175.53	9,224.5	5,597.5	-782.4	61.2	784.8	0.00	605,901.76	666,910.74
9,900.0	89.17	175.53	9,226.0	5,599.0	-882.1	69.0	884.8	0.00	605,802.08	666,918.54
10,000.0	89.17	175.53	9,227.4	5,600.4	-981.8	76.8	984.8	0.00	605,702.39	666,926.34
10,100.0	89.17	175.53	9,228.9	5,601.9	-1,081.5	84.6	1,084.8	0.00	605,602.71	666,934.14
10,200.0	89.17	175.53	9,230.3	5,603.3	-1,181.2	92.4	1,184.8	0.00	605,503.02	666,941.94
10,300.0	89.17	175.53	9,231.8	5,604.8	-1,280.9	100.2	1,284.8	0.00	605,403.34	666,949.74
10,400.0	89.17	175.53	9,233.2	5,606.2	-1,380.5	108.0	1,384.8	0.00	605,303.65	666,957.55
10,500.0	89.17	175.53	9,234.6	5,607.6	-1,480.2	115.8	1,484.8	0.00	605,203.97	666,965.35
10,600.0	89.17	175.53	9,236.1	5,609.1	-1,579.9	123.6	1,584.7	0.00	605,104.28	666,973.15
10,700.0	89.17	175.53	9,237.5	5,610.5	-1,679.6	131.4	1,684.7	0.00	605,004.60	666,980.95
10,800.0	89.17	175.53	9,239.0	5,612.0	-1,779.3	139.3	1,784.7	0.00	604,904.91	666,988.75
10,900.0	89.17	175.53	9,240.4	5,613.4	-1,879.0	147.1	1,884.7	0.00	604,805.23	666,996.55



Pathfinder Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #22H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #22H
TVD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
MD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
North Reference: Gnd
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
11,000.0	89.17	175.53	9,241.8	5,614.8	-1,978.7	154.9	1,984.7	0.00	604,705.54	667,004.35
11,100.0	89.17	175.53	9,243.3	5,616.3	-2,078.3	162.7	2,084.7	0.00	604,605.86	667,012.16
11,200.0	89.17	175.53	9,244.7	5,617.7	-2,178.0	170.5	2,184.7	0.00	604,506.17	667,019.96
11,300.0	89.17	175.53	9,246.2	5,619.2	-2,277.7	178.3	2,284.7	0.00	604,406.49	667,027.76
11,400.0	89.17	175.53	9,247.6	5,620.6	-2,377.4	186.1	2,384.7	0.00	604,306.80	667,035.56
11,500.0	89.17	175.53	9,249.0	5,622.0	-2,477.1	193.9	2,484.7	0.00	604,207.12	667,043.36
11,600.0	89.17	175.53	9,250.5	5,623.5	-2,576.8	201.7	2,584.6	0.00	604,107.43	667,051.16
11,700.0	89.17	175.53	9,251.9	5,624.9	-2,676.5	209.5	2,684.6	0.00	604,007.75	667,058.97
11,800.0	89.17	175.53	9,253.4	5,626.4	-2,776.1	217.3	2,784.6	0.00	603,908.06	667,066.77
11,900.0	89.17	175.53	9,254.8	5,627.8	-2,875.8	225.1	2,884.6	0.00	603,808.38	667,074.57
12,000.0	89.17	175.53	9,256.3	5,629.3	-2,975.5	232.9	2,984.6	0.00	603,708.69	667,082.37
12,100.0	89.17	175.53	9,257.7	5,630.7	-3,075.2	240.7	3,084.6	0.00	603,609.01	667,090.17
12,200.0	89.17	175.53	9,259.1	5,632.1	-3,174.9	248.5	3,184.6	0.00	603,509.33	667,097.97
12,300.0	89.17	175.53	9,260.6	5,633.6	-3,274.6	256.3	3,284.6	0.00	603,409.64	667,105.77
12,400.0	89.17	175.53	9,262.0	5,635.0	-3,374.2	264.1	3,384.6	0.00	603,309.96	667,113.58
12,500.0	89.17	175.53	9,263.5	5,636.5	-3,473.9	271.9	3,484.6	0.00	603,210.27	667,121.38
12,600.0	89.17	175.53	9,264.9	5,637.9	-3,573.6	279.7	3,584.5	0.00	603,110.59	667,129.18
12,700.0	89.17	175.53	9,266.3	5,639.3	-3,673.3	287.5	3,684.5	0.00	603,010.90	667,136.98
12,800.0	89.17	175.53	9,267.8	5,640.8	-3,773.0	295.3	3,784.5	0.00	602,911.22	667,144.78
12,900.0	89.17	175.53	9,269.2	5,642.2	-3,872.7	303.1	3,884.5	0.00	602,811.53	667,152.58
13,000.0	89.17	175.53	9,270.7	5,643.7	-3,972.4	310.9	3,984.5	0.00	602,711.85	667,160.39
13,100.0	89.17	175.53	9,272.1	5,645.1	-4,072.0	318.7	4,084.5	0.00	602,612.16	667,168.19
13,200.0	89.17	175.53	9,273.6	5,646.6	-4,171.7	326.5	4,184.5	0.00	602,512.48	667,175.99
13,300.0	89.17	175.53	9,275.0	5,648.0	-4,271.4	334.3	4,284.5	0.00	602,412.79	667,183.79
13,400.0	89.17	175.53	9,276.4	5,649.4	-4,371.1	342.1	4,384.5	0.00	602,313.11	667,191.59
13,500.0	89.17	175.53	9,277.9	5,650.9	-4,470.8	349.9	4,484.4	0.00	602,213.42	667,199.39
13,600.0	89.17	175.53	9,279.3	5,652.3	-4,570.5	357.7	4,584.4	0.00	602,113.74	667,207.20



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

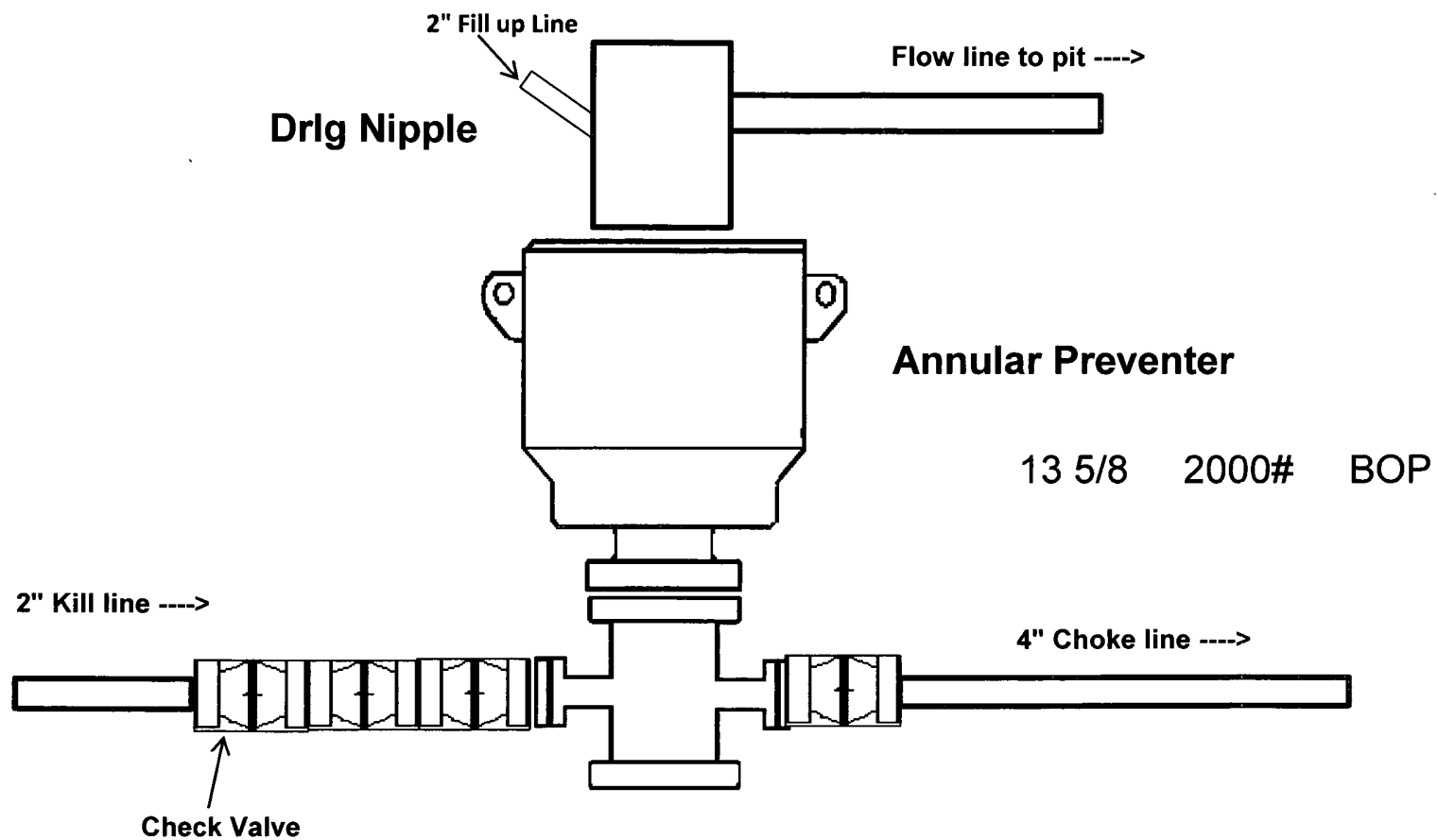
Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #22H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #22H
TVD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
MD Reference: KB = 17' @ 3627.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

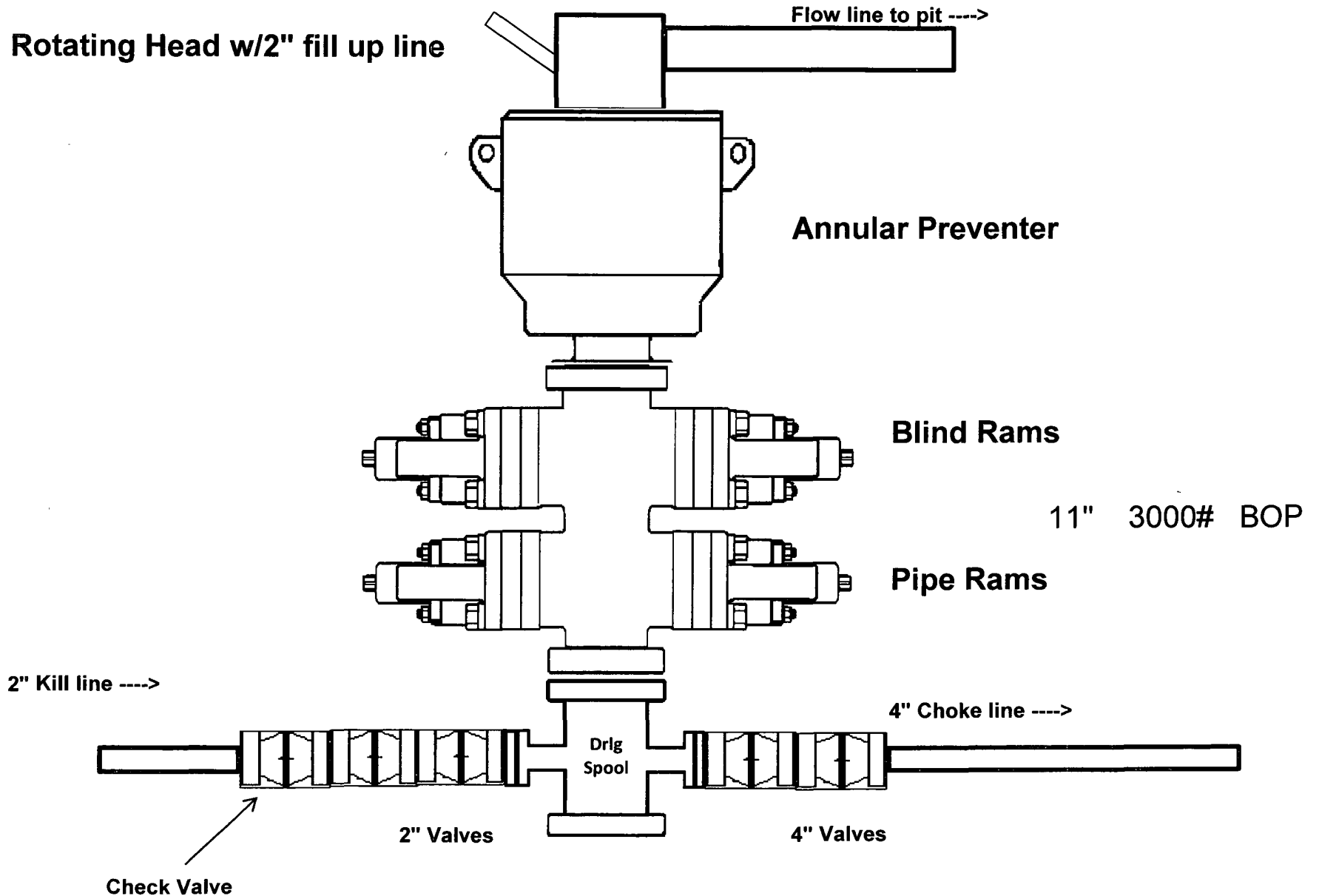
Planned Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
13,647.5	89.17	175.53	9,280.0	5,653.0	-4,617.8	361.4	4,631.9	0.00	602,066.40	667,210.90

Checked By: _____ Approved By: _____ Date: _____

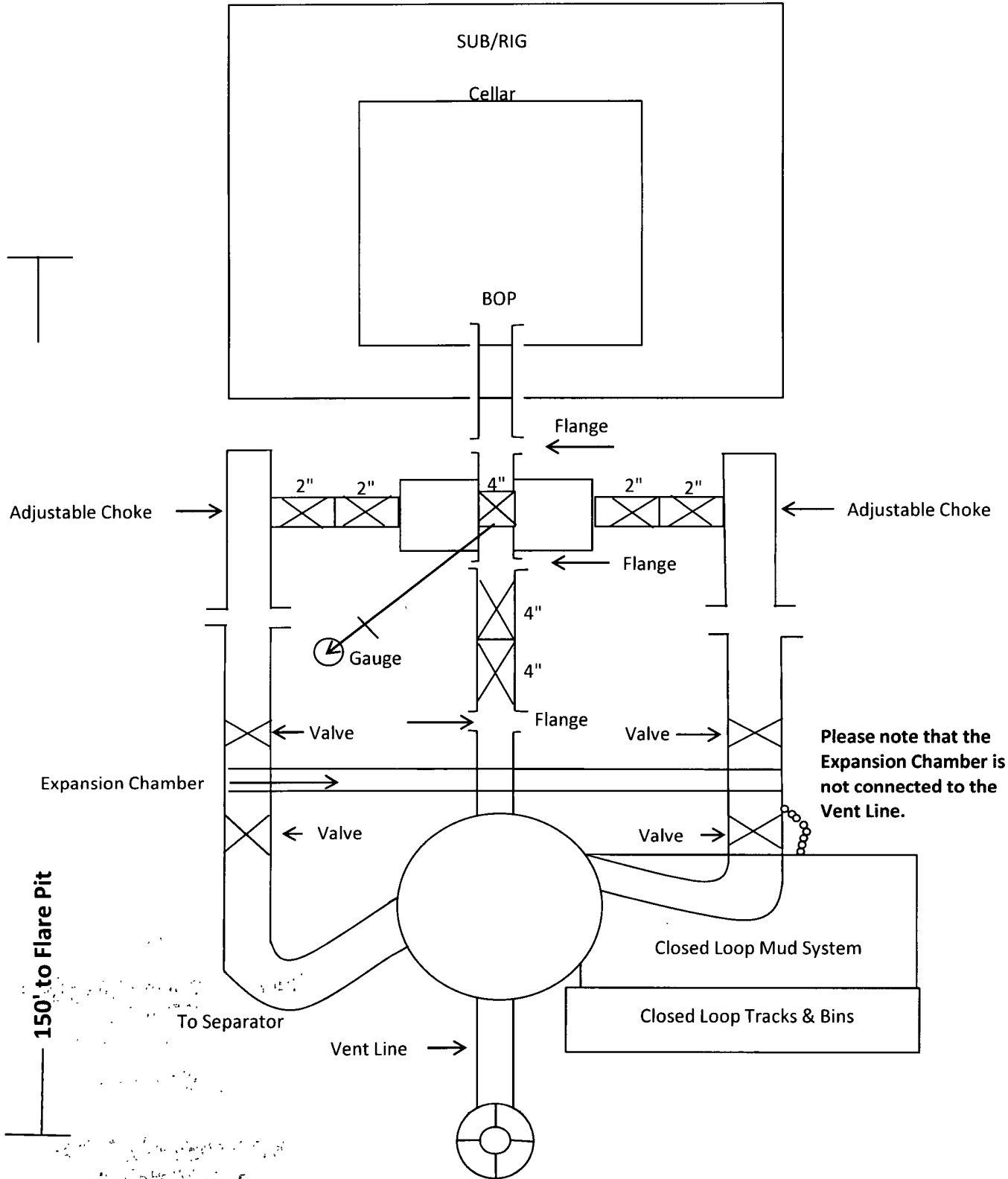
2,000 psi BOP Schematic



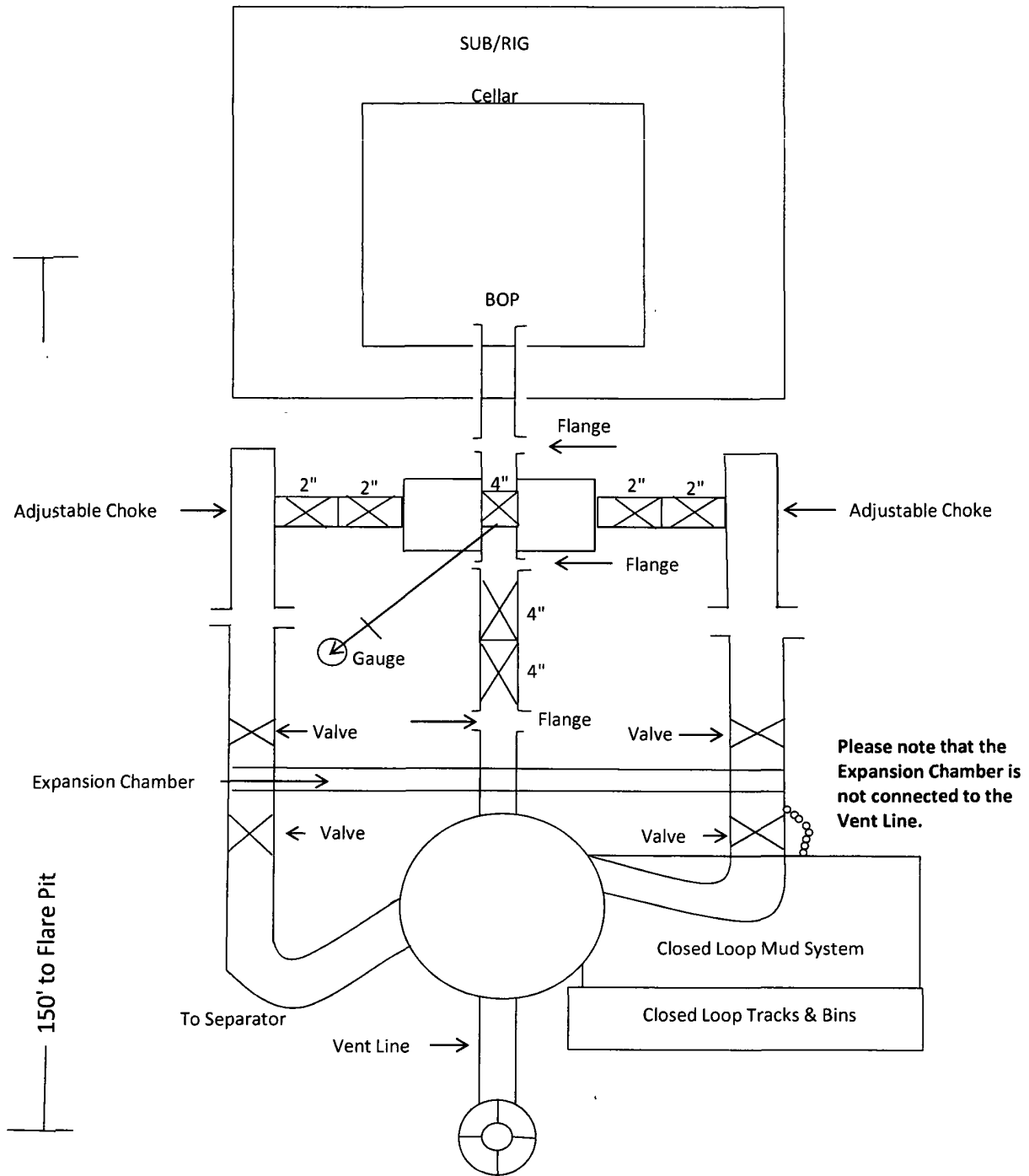
3,000 psi BOP Schematic



2M Choke Manifold Equipment



3M Choke Manifold Equipment



COG Operating LLC

Rig Plat & Closed Loop Equipment Diagram

Well pad will be 340' X 340'
with cellar in center of pad

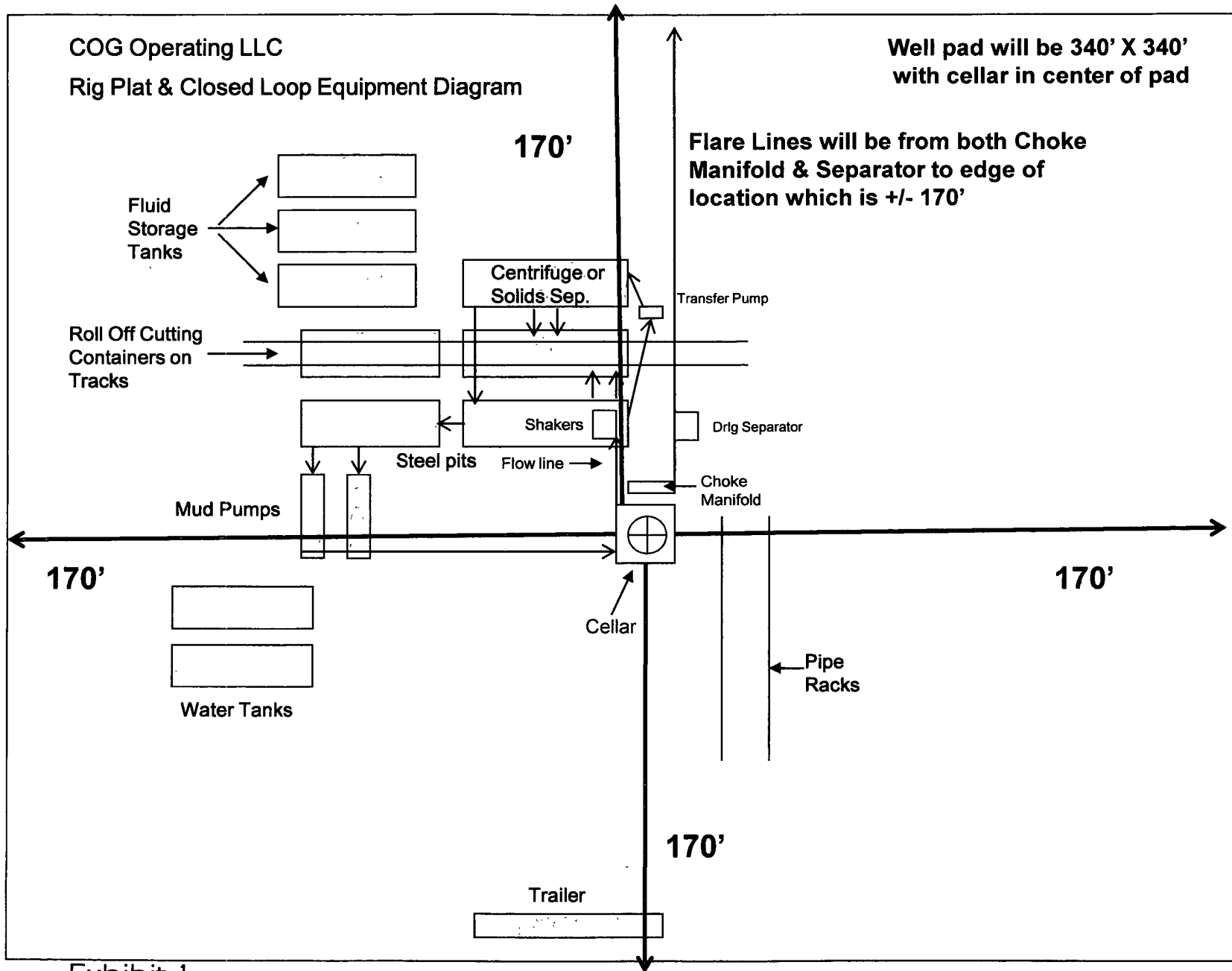


Exhibit 1