

OPERATOR'S COPY

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

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

a. Type of Work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NM025566	
b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		6. If Indian, Allottee or Tribe Name	
Name of Operator COG Operating LLC.		7. If Unit or CA Agreement, Name and No. Lusk Deep Unit - NMNM70982X	
a. Address 2208 West Main Street Artesia, NM 88210		8. Lease Name and Well No. (50816) Lusk Deep Unit A #23H	
3b. Phone No. (include area code) (229137) 575-748-6940		9. API Well No. 30-025-40260	
Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 330' FSL & 380' FEL Unit Letter P (SESE) SHL At proposed prod. Zone 330' FNL & 380' FEL Unit Letter A (NENE) BHL		10. Field and Pool, or Exploratory (41440) Lusk; Bone Spring West	
4. Distance in miles and direction from nearest town or post office* About 12 miles from Maljamar		11. Sec., T.R.M. or Blk and Survey or Area Sec. 19 - T19S - R32E	
5. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any) 330'		12. County or Parish Lea County	
8. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. 330'		13. State NM	
1. Elevations (Show whether DF, KDB, RT, GL, etc.) 3560.8		16. No. of acres in lease 320	
22. Approximate date work will start* ASAP		17. Spacing Unit dedicated to this well 160	
20. BLM/BIA Bond No. on file NMB000740		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).
- Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
- Operator certification
- Such other site specific information and/or plans as may be required by the authorized officer.

5. Signature <i>Mayte Reyes</i>	Name (Printed/Typed) Mayte Reyes	Date 7/5/2011
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Regulatory Analyst Approved by (Signature) <i>Don Peterson</i>	Name (Printed/Typed) Is/ Don Peterson	Date 8/31/11
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Signature <i>GS</i> FIELD MANAGER	Office CARLSBAD FIELD OFFICE
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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

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)

Capitan Controlled Water Basin

Approval Subject to General Requirement:
& Special Stipulations Attached

KZ 09/01/11

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

STATEMENT ACCEPTING RESPONSIBILITY FOR OPERATIONS

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

Date: July 5, 2011

Lease #: NM025566
Lusk Deep Unit A #23H

Legal Description: Sec. 19 – T19S – R32E
Eddy County, New Mexico

Formation(s): Bone Springs

Bond Coverage: Statewide

BLM Bond File #: NMB000740

COG OPERATING LLC



Mayte Reyes
Regulatory Analyst

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Arteson, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 15, 2009
Submit one copy to appropriate
District Office
☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 32-025-40260	Pool Code 41480 41440	Pool Name Lusk; Bone Spring West
Property Code 308161	Property Name LUSK DEEP UNIT "A"	Well Number 23H
OGRM No. 229137	Operator Name COG OPERATING, LLC.	Elevation 3560.8

Surface Location

LL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	19	19 S	32 E		330	SOUTH	380	EAST	LEA

Bottom Hole Location If Different From Surface

LL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	19	19 S	32 E		330	NORTH	380	EAST	LEA

Dedicated Acres 100	Joint or Infill	Consolidation Code	Order No.
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No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

NW CORNER SEC. 19 LAT. = 32°39'11.76"N LONG. = 103°48'51.22"W NMSP EAST (FT) N = 601781.56 E = 701103.89	BOTTOM OF HOLE LAT. = 32°39'08.33"N LONG. = 103°47'53.53"W NMSP EAST (FT) N = 601458.08 E = 705037.47	NE CORNER SEC. 19 LAT. = 32°39'11.60"N LONG. = 103°47'49.09"W NMSP EAST (FT) N = 601789.77 E = 706415.06	13 OPERATOR CERTIFICATION I hereby certify that the information contained herein is true and correct, to the best of my knowledge and belief, and that this organization either owns a working interest or undivided mineral interest in the land including the proposed future hole location or has a right to drill this well at this location pursuant to a contract with an owner of such mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the court.
SW CORNER SEC. 19 LAT. = 32°38'19.54"N LONG. = 103°48'51.09"W NMSP EAST (FT) N = 596502.34 E = 701140.60	LUSK DEEP UNIT "A" #23H ELEV. = 3560.8 LAT. = 32°38'22.646"N (NAD83) LONG. = 103°47'53.427"W NMSP EAST (FT) N = 596841.02 E = 706059.45	SE CORNER SEC. 19 LAT. = 32°38'19.37"N LONG. = 103°47'48.98"W NMSP EAST (FT) N = 596511.51 E = 706451.67	14 SURVEYOR CERTIFICATION I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief. JUNE 18, 2011 Signature and Seal of Professional Surveyor Certificate Number: 11110001, JARAMILLO, PLS 12797 SURVEY NO. 488

COG Operating LLC
DRILLING AND OPERATIONS PROGRAM
Lusk Deep Unit A #23H
SHL: 330' FSL & 380' FEL
BHL: 330' FNL & 380' FEL
Section 19 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	~ 223'
Ruslter	742'
Top of Salt	837'
Base of Salt	2491'
Yates	2547'
Seven Rivers	2651'
Capitan Reef	2820'
Delaware	4518' Oil
Bone Spring	7156'
1 st BSS	8407' Oil
2 nd BSS	9098' Oil
TD TVD	9250'
TMD	13,712'

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 50' above Capitan reef.

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' - 775' 840	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' - 4500'	Intrmd	9 5/8"	New	40#	BTC	J-55	1.125	1.125	1.6
7 7/8"	0' - 13,712'	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
- 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
- Lead: 850 sx 35:65:6 C + 5% Salt + 5 pps Gilsonite
(12.7 ppg / 1.89 cuft/sx)
- Tail: 250 sx Class C + 2% CaCl₂
(14.8 ppg / 1.35 cuft/sx)
- See* *Cost* **May require 2 stages based on circulation through Reef
- **Calculated w/35% excess on OH volumes
- d. 5 1/2" Production
- Lead: 650 sx 35:65:6 H + 5% Salt + Gilsonite + HR601
(12.5 ppg / 1.96 cuft/sx)
- Tail: 1100 sx 50:50:2 H + 1% Salt + CFR-3 + HR601
(14.4 ppg / 1.25 cuft/sx)
- See* *Cost* **Calculated w/35% excess on OH volumes

- The above cement volumes could be revised pending the caliper measurement from the open hole logs.
- The 9-5/8" intermediate string TOC is designed to circulate cement to surface.
- The production string TOC is designed to reach 50' above Capitan Reef shoe or 100' above 9-5/8" ECP/DVT if it is ran.

5. Minimum Specifications for Pressure Control:

Nipple up on 13 3/8 with 2M system (Hydril) tested to 2000# by independent tester,
Nipple up on 9 5/8 with 3M system tested to 3000# by independent tester
Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. A 2" kill line and a 3" choke line will be included in the drilling spool located below the ram-type BOP. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold with 3000 psi WP rating.

6. Estimated BHP:

Lateral TD = 4033 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' 840	Fresh Water	8.4	29	N.C.
775' - 4500'	Brine	10	29	N.C.
4500' - 13,712' (Lateral)	Cut Brine	8.9 - 9.2	29	N.C.

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

8. Auxiliary Well Control and Monitoring Equipment:

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

9. Testing, Logging and Coring Program: See Log

- 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. Lost circulation maybe encountered in the Capitan Reef. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. No H₂S is anticipated to be encountered.

11. Anticipated starting date and Duration of Operations:

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



COG Operating LLC

Lea County(NAD83)

Lusk Deep Unit A

#23H

OH

Plan: Design #1

Pathfinder X&Y Report

29 June, 2011





Pathfinder
Pathfinder X&Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD83)
Site: Lusk Deep Unit A
Well: #23H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #23H
TVD Reference: 18" KB @ 3578.80usft (Original Well Elev)
MD Reference: 18" KB @ 3578.80usft (Original Well Elev)
North Reference: Grd
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	Lusk Deep Unit A		
Site Position:		Northing:	596,841.020 usft
From:	Map	Easting:	706,069.450 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 38' 22.646 N
		Longitude:	103° 47' 53.428 W
		Grid Convergence:	0 29 "

Well	#23H		
Well Position	+N/-S	0.00 usft	Northing: 596,841.020 usft
	+E/-W	0.00 usft	Easting: 706,069.450 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 38' 22.646 N
		Longitude:	103° 47' 53.428 W
		Ground Level:	3,560.80 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	IGRF200510	6/29/2011	7.71
			Dip Angle
			60.55
			Field Strength
			48,873

Design	Design #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			359.60

Survey Tool Program	Date 6/29/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
0.00	13,712.55	Design #1 (OH)	MWD
			Description
			MWD - Standard



Pathfinder
Pathfinder X&Y Report



Company: COG Operating LLC
Project: Lea County(NAD83)
Site: Lusk Deep Unit A
Well: #23H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #23H
TVD Reference: 18" KB @ 3578.80usft (Original Well Elev)
MD Reference: 18" KB @ 3578.80usft (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)
0.00	0.00	0.00	0.00	-3,578.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
100.00	0.00	0.00	100.00	-3,478.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
200.00	0.00	0.00	200.00	-3,378.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
300.00	0.00	0.00	300.00	-3,278.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
400.00	0.00	0.00	400.00	-3,178.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
500.00	0.00	0.00	500.00	-3,078.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
600.00	0.00	0.00	600.00	-2,978.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
700.00	0.00	0.00	700.00	-2,878.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
800.00	0.00	0.00	800.00	-2,778.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
900.00	0.00	0.00	900.00	-2,678.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
1,000.00	0.00	0.00	1,000.00	-2,578.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
1,100.00	0.00	0.00	1,100.00	-2,478.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
1,200.00	0.00	0.00	1,200.00	-2,378.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
1,300.00	0.00	0.00	1,300.00	-2,278.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
1,400.00	0.00	0.00	1,400.00	-2,178.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
1,500.00	0.00	0.00	1,500.00	-2,078.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
1,600.00	0.00	0.00	1,600.00	-1,978.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
1,700.00	0.00	0.00	1,700.00	-1,878.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
1,800.00	0.00	0.00	1,800.00	-1,778.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
1,900.00	0.00	0.00	1,900.00	-1,678.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
2,000.00	0.00	0.00	2,000.00	-1,578.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
2,100.00	0.00	0.00	2,100.00	-1,478.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
2,200.00	0.00	0.00	2,200.00	-1,378.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
2,300.00	0.00	0.00	2,300.00	-1,278.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
2,400.00	0.00	0.00	2,400.00	-1,178.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
2,500.00	0.00	0.00	2,500.00	-1,078.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
2,600.00	0.00	0.00	2,600.00	-978.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45



Pathfinder
Pathfinder X&Y Report



Company: COG Operating LLC
Project: Lea County(NAD83)
Site: Lusk Deep Unit A
Well: #23H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #23H
TVD Reference: 18" KB @ 3578.80usft (Original Well Elev)
MD Reference: 18" KB @ 3578.80usft (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)
2,700.00	0.00	0.00	2,700.00	-878.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
2,800.00	0.00	0.00	2,800.00	-778.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
2,900.00	0.00	0.00	2,900.00	-678.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
3,000.00	0.00	0.00	3,000.00	-578.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
3,100.00	0.00	0.00	3,100.00	-478.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
3,200.00	0.00	0.00	3,200.00	-378.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
3,300.00	0.00	0.00	3,300.00	-278.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
3,400.00	0.00	0.00	3,400.00	-178.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
3,500.00	0.00	0.00	3,500.00	-78.80	0.00	0.00	0.00	0.00	596,841.02	706,069.45
3,600.00	0.00	0.00	3,600.00	21.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
3,700.00	0.00	0.00	3,700.00	121.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
3,800.00	0.00	0.00	3,800.00	221.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
3,900.00	0.00	0.00	3,900.00	321.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
4,000.00	0.00	0.00	4,000.00	421.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
4,100.00	0.00	0.00	4,100.00	521.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
4,200.00	0.00	0.00	4,200.00	621.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
4,300.00	0.00	0.00	4,300.00	721.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
4,400.00	0.00	0.00	4,400.00	821.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
4,500.00	0.00	0.00	4,500.00	921.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
4,600.00	0.00	0.00	4,600.00	1,021.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
4,700.00	0.00	0.00	4,700.00	1,121.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
4,800.00	0.00	0.00	4,800.00	1,221.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
4,900.00	0.00	0.00	4,900.00	1,321.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
5,000.00	0.00	0.00	5,000.00	1,421.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
5,100.00	0.00	0.00	5,100.00	1,521.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
5,200.00	0.00	0.00	5,200.00	1,621.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
5,300.00	0.00	0.00	5,300.00	1,721.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45



Pathfinder
Pathfinder X&Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD83)
Site: Lusk Deep Unit A
Well: #23H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #23H
TVD Reference: 18' KB @ 3578.80usft (Original Well Elev)
MD Reference: 18' KB @ 3578.80usft (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)
5,400.00	0.00	0.00	5,400.00	1,821.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
5,500.00	0.00	0.00	5,500.00	1,921.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
5,600.00	0.00	0.00	5,600.00	2,021.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
5,700.00	0.00	0.00	5,700.00	2,121.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
5,800.00	0.00	0.00	5,800.00	2,221.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
5,900.00	0.00	0.00	5,900.00	2,321.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
6,000.00	0.00	0.00	6,000.00	2,421.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
6,100.00	0.00	0.00	6,100.00	2,521.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
6,200.00	0.00	0.00	6,200.00	2,621.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
6,300.00	0.00	0.00	6,300.00	2,721.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
6,400.00	0.00	0.00	6,400.00	2,821.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
6,500.00	0.00	0.00	6,500.00	2,921.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
6,600.00	0.00	0.00	6,600.00	3,021.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
6,700.00	0.00	0.00	6,700.00	3,121.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
6,800.00	0.00	0.00	6,800.00	3,221.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
6,900.00	0.00	0.00	6,900.00	3,321.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
7,000.00	0.00	0.00	7,000.00	3,421.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
7,100.00	0.00	0.00	7,100.00	3,521.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
7,200.00	0.00	0.00	7,200.00	3,621.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
7,300.00	0.00	0.00	7,300.00	3,721.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
7,400.00	0.00	0.00	7,400.00	3,821.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
7,500.00	0.00	0.00	7,500.00	3,921.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
7,600.00	0.00	0.00	7,600.00	4,021.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
7,700.00	0.00	0.00	7,700.00	4,121.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
7,800.00	0.00	0.00	7,800.00	4,221.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
7,900.00	0.00	0.00	7,900.00	4,321.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
8,000.00	0.00	0.00	8,000.00	4,421.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45



Pathfinder
Pathfinder X&Y Report

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8,100.00	0.00	0.00	8,100.00	4,521.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
8,200.00	0.00	0.00	8,200.00	4,621.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
8,300.00	0.00	0.00	8,300.00	4,721.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
8,400.00	0.00	0.00	8,400.00	4,821.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
8,500.00	0.00	0.00	8,500.00	4,921.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
8,600.00	0.00	0.00	8,600.00	5,021.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
8,700.00	0.00	0.00	8,700.00	5,121.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
8,800.00	0.00	0.00	8,800.00	5,221.20	0.00	0.00	0.00	0.00	596,841.02	706,069.45
8,822.57	0.00	0.00	8,822.57	5,243.77	0.00	0.00	0.00	0.00	596,841.02	706,069.45
8,825.00	0.29	359.60	8,825.00	5,246.20	0.01	0.00	0.01	12.00	596,841.03	706,069.45
8,850.00	3.29	359.60	8,849.98	5,271.18	0.79	-0.01	0.79	12.00	596,841.81	706,069.44
8,875.00	6.29	359.60	8,874.89	5,296.09	2.88	-0.02	2.88	12.00	596,843.90	706,069.43
8,900.00	9.29	359.60	8,899.66	5,320.86	6.26	-0.04	6.26	12.00	596,847.28	706,069.41
8,925.00	12.29	359.60	8,924.22	5,345.42	10.94	-0.08	10.95	12.00	596,851.96	706,069.37
8,950.00	15.29	359.60	8,948.49	5,369.69	16.90	-0.12	16.90	12.00	596,857.92	706,069.33
8,975.00	18.29	359.60	8,972.42	5,393.62	24.13	-0.17	24.13	12.00	596,865.15	706,069.28
9,000.00	21.29	359.60	8,995.94	5,417.14	32.59	-0.23	32.59	12.00	596,873.61	706,069.22
9,025.00	24.29	359.60	9,018.99	5,440.19	42.27	-0.29	42.27	12.00	596,883.29	706,069.16
9,050.00	27.29	359.60	9,041.50	5,462.70	53.15	-0.37	53.15	12.00	596,894.17	706,069.08
9,075.00	30.29	359.60	9,063.40	5,484.60	65.19	-0.45	65.19	12.00	596,906.21	706,069.00
9,100.00	33.29	359.60	9,084.65	5,505.85	78.36	-0.54	78.36	12.00	596,919.38	706,068.91
9,125.00	36.29	359.60	9,105.18	5,526.38	92.62	-0.64	92.62	12.00	596,933.64	706,068.81
9,150.00	39.29	359.60	9,124.93	5,546.13	107.94	-0.75	107.94	12.00	596,948.96	706,068.70
9,175.00	42.29	359.60	9,143.86	5,565.06	124.27	-0.86	124.27	12.00	596,965.29	706,068.59
9,200.00	45.29	359.60	9,161.90	5,583.10	141.57	-0.98	141.57	12.00	596,982.59	706,068.47
9,225.00	48.29	359.60	9,179.02	5,600.22	159.78	-1.11	159.79	12.00	597,000.80	706,068.34
9,250.00	51.29	359.60	9,195.15	5,616.35	178.87	-1.24	178.88	12.00	597,019.89	706,068.21



Pathfinder
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MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (*/100usft)	Northing (usft)	Easting (usft)
9,275.00	54.29	359.60	9,210.27	5,631.47	198.78	-1.38	198.79	12.00	597,039.80	706,068.07
9,300.00	57.29	359.60	9,224.32	5,645.52	219.45	-1.52	219.46	12.00	597,060.47	706,067.93
9,325.00	60.29	359.60	9,237.28	5,658.48	240.83	-1.67	240.84	12.00	597,081.85	706,067.78
9,350.00	63.29	359.60	9,249.09	5,670.29	262.86	-1.82	262.87	12.00	597,103.88	706,067.63
9,375.00	66.29	359.60	9,259.74	5,680.94	285.48	-1.98	285.48	12.00	597,126.50	706,067.47
9,400.00	69.29	359.60	9,269.19	5,690.39	308.62	-2.14	308.63	12.00	597,149.64	706,067.31
9,425.00	72.29	359.60	9,277.41	5,698.61	332.23	-2.30	332.23	12.00	597,173.25	706,067.15
9,450.00	75.29	359.60	9,284.39	5,705.59	356.23	-2.47	356.24	12.00	597,197.25	706,066.98
9,475.00	78.29	359.60	9,290.10	5,711.30	380.56	-2.64	380.57	12.00	597,221.58	706,066.81
9,500.00	81.29	359.60	9,294.53	5,715.73	405.16	-2.81	405.17	12.00	597,246.18	706,066.64
9,525.00	84.29	359.60	9,297.67	5,718.87	429.96	-2.98	429.97	12.00	597,270.98	706,066.47
9,550.00	87.29	359.60	9,299.50	5,720.70	454.89	-3.15	454.90	12.00	597,295.91	706,066.30
9,575.00	90.29	359.60	9,300.03	5,721.23	479.88	-3.32	479.89	12.00	597,320.90	706,066.13
9,578.34	90.69	359.60	9,300.00	5,721.20	483.23	-3.35	483.24	12.00	597,324.25	706,066.10
9,600.00	90.69	359.60	9,299.74	5,720.94	504.88	-3.50	504.89	0.00	597,345.90	706,065.95
9,700.00	90.69	359.60	9,298.53	5,719.73	604.87	-4.19	604.89	0.00	597,445.89	706,065.26
9,800.00	90.69	359.60	9,297.32	5,718.52	704.86	-4.88	704.88	0.00	597,545.88	706,064.57
9,900.00	90.69	359.60	9,296.11	5,717.31	804.85	-5.57	804.87	0.00	597,645.87	706,063.88
10,000.00	90.69	359.60	9,294.90	5,716.10	904.84	-6.27	904.86	0.00	597,745.86	706,063.18
10,100.00	90.69	359.60	9,293.69	5,714.89	1,004.83	-6.96	1,004.86	0.00	597,845.85	706,062.49
10,200.00	90.69	359.60	9,292.48	5,713.68	1,104.82	-7.65	1,104.85	0.00	597,945.84	706,061.80
10,300.00	90.69	359.60	9,291.27	5,712.47	1,204.81	-8.35	1,204.84	0.00	598,045.83	706,061.10
10,400.00	90.69	359.60	9,290.06	5,711.26	1,304.80	-9.04	1,304.83	0.00	598,145.82	706,060.41
10,500.00	90.69	359.60	9,288.85	5,710.05	1,404.79	-9.73	1,404.83	0.00	598,245.81	706,059.72
10,600.00	90.69	359.60	9,287.64	5,708.84	1,504.78	-10.42	1,504.82	0.00	598,345.80	706,059.03
10,700.00	90.69	359.60	9,286.43	5,707.63	1,604.77	-11.12	1,604.81	0.00	598,445.79	706,058.33
10,800.00	90.69	359.60	9,285.23	5,706.43	1,704.76	-11.81	1,704.81	0.00	598,545.78	706,057.64



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10,900.00	90.69	359.60	9,284.02	5,705.22	1,804.75	-12.50	1,804.80	0.00	598,645.77	706,056.95
11,000.00	90.69	359.60	9,282.81	5,704.01	1,904.75	-13.19	1,904.79	0.00	598,745.77	706,056.26
11,100.00	90.69	359.60	9,281.60	5,702.80	2,004.74	-13.89	2,004.78	0.00	598,845.76	706,055.56
11,200.00	90.69	359.60	9,280.39	5,701.59	2,104.73	-14.58	2,104.78	0.00	598,945.75	706,054.87
11,300.00	90.69	359.60	9,279.18	5,700.38	2,204.72	-15.27	2,204.77	0.00	599,045.74	706,054.18
11,400.00	90.69	359.60	9,277.97	5,699.17	2,304.71	-15.96	2,304.76	0.00	599,145.73	706,053.49
11,500.00	90.69	359.60	9,276.76	5,697.96	2,404.70	-16.66	2,404.75	0.00	599,245.72	706,052.79
11,600.00	90.69	359.60	9,275.55	5,696.75	2,504.69	-17.35	2,504.75	0.00	599,345.71	706,052.10
11,700.00	90.69	359.60	9,274.34	5,695.54	2,604.68	-18.04	2,604.74	0.00	599,445.70	706,051.41
11,800.00	90.69	359.60	9,273.13	5,694.33	2,704.67	-18.73	2,704.73	0.00	599,545.69	706,050.72
11,900.00	90.69	359.60	9,271.92	5,693.12	2,804.66	-19.43	2,804.72	0.00	599,645.68	706,050.02
12,000.00	90.69	359.60	9,270.71	5,691.91	2,904.65	-20.12	2,904.72	0.00	599,745.67	706,049.33
12,100.00	90.69	359.60	9,269.50	5,690.70	3,004.64	-20.81	3,004.71	0.00	599,845.66	706,048.64
12,200.00	90.69	359.60	9,268.29	5,689.49	3,104.63	-21.50	3,104.70	0.00	599,945.65	706,047.95
12,300.00	90.69	359.60	9,267.08	5,688.28	3,204.62	-22.20	3,204.70	0.00	600,045.64	706,047.25
12,400.00	90.69	359.60	9,265.87	5,687.07	3,304.61	-22.89	3,304.69	0.00	600,145.63	706,046.56
12,500.00	90.69	359.60	9,264.67	5,685.87	3,404.60	-23.58	3,404.68	0.00	600,245.62	706,045.87
12,600.00	90.69	359.60	9,263.46	5,684.66	3,504.59	-24.27	3,504.67	0.00	600,345.61	706,045.18
12,700.00	90.69	359.60	9,262.25	5,683.45	3,604.58	-24.97	3,604.67	0.00	600,445.60	706,044.48
12,800.00	90.69	359.60	9,261.04	5,682.24	3,704.57	-25.66	3,704.66	0.00	600,545.59	706,043.79
12,900.00	90.69	359.60	9,259.83	5,681.03	3,804.56	-26.35	3,804.65	0.00	600,645.58	706,043.10
13,000.00	90.69	359.60	9,258.62	5,679.82	3,904.55	-27.04	3,904.64	0.00	600,745.57	706,042.41
13,100.00	90.69	359.60	9,257.41	5,678.61	4,004.54	-27.74	4,004.64	0.00	600,845.56	706,041.71
13,200.00	90.69	359.60	9,256.20	5,677.40	4,104.53	-28.43	4,104.63	0.00	600,945.55	706,041.02
13,300.00	90.69	359.60	9,254.99	5,676.19	4,204.52	-29.12	4,204.62	0.00	601,045.54	706,040.33
13,400.00	90.69	359.60	9,253.78	5,674.98	4,304.51	-29.82	4,304.62	0.00	601,145.53	706,039.63
13,500.00	90.69	359.60	9,252.57	5,673.77	4,404.50	-30.51	4,404.61	0.00	601,245.52	706,038.94



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13,600.00	90.69	359.60	9,251.36	5,672.56	4,504.49	-31.20	4,504.60	0.00	601,345.51	706,038.25
13,700.00	90.69	359.60	9,250.15	5,671.35	4,604.48	-31.89	4,604.59	0.00	601,445.50	706,037.56
13,712.58	90.69	359.60	9,250.00	5,671.20	4,617.06	-31.98	4,617.17	0.00	601,458.08	706,037.47
BHL (Lusk 23)										

Checked By: _____

Approved By: _____

Date: _____



Project: Lea County(NAD83)
 Site: Lusk Deep Unit A
 Well: #23H
 Wellbore: OH
 Plan: Design #1 (#23H/OH)

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



Azimuths to Grid North
 True North: -0.29°
 Magnetic North: 7.42°

Magnetic Field
 Strength: 48873.2snT
 Dip Angle: 60.56°
 Date: 6/29/2011
 Model: IGRF200510

WELL DETAILS: #23H

Ground Elevation: 3560.80
 RKB Elevation: 18" KB @ 3578.80usft (Original Well Elev)
 Rig Name: Original Well Elev

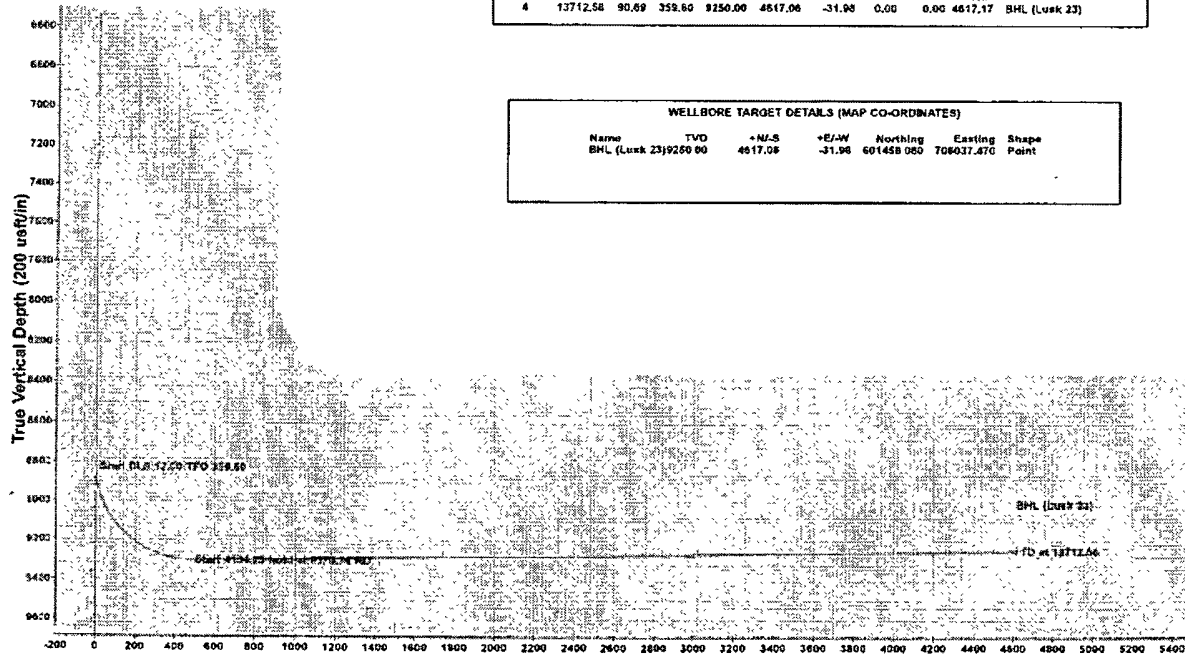
+N/S	+E/W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	596841.020	706059.450	32° 30' 22.648 N	103° 47' 53.428 W	

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/S	+E/W	Dlog	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	8822.57	0.00	0.00	8822.57	0.00	0.00	0.00	0.00	0.00	
3	9578.34	90.69	359.60	9300.00	483.23	-3.35	12.00	359.60	483.24	
4	13712.58	90.69	359.60	9350.00	4817.06	-31.96	0.00	0.00	4817.17	BHL (Lusk 23)

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/S	+E/W	Northing	Easting	Shape
BHL (Lusk 23)9250.00	4617.06	-31.96	601458.050	706037.670		Point

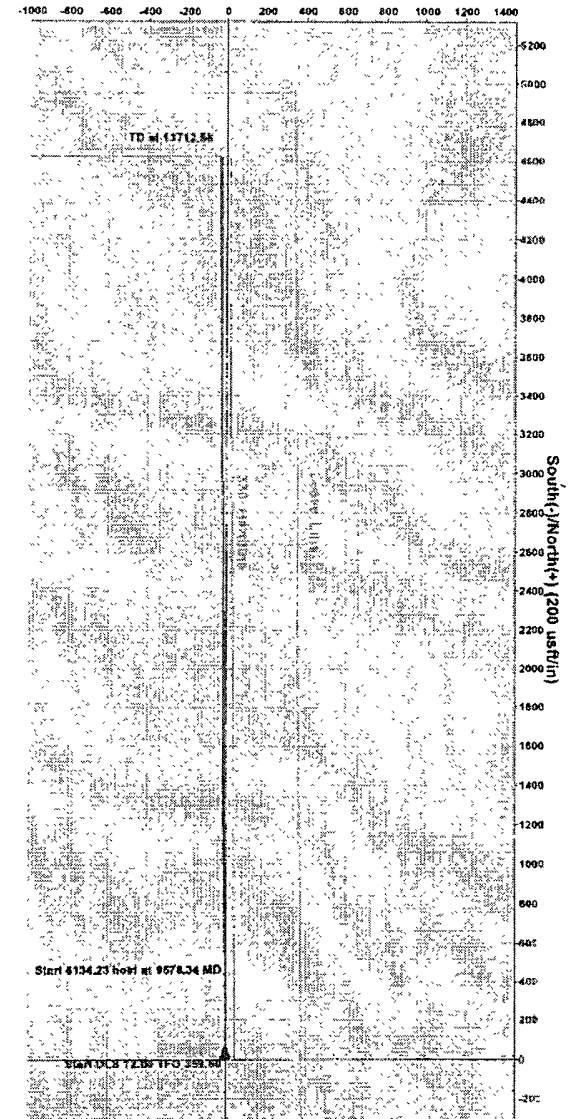


Vertical Section at 359.60° (200 usft/in)



A Schlumberger Company

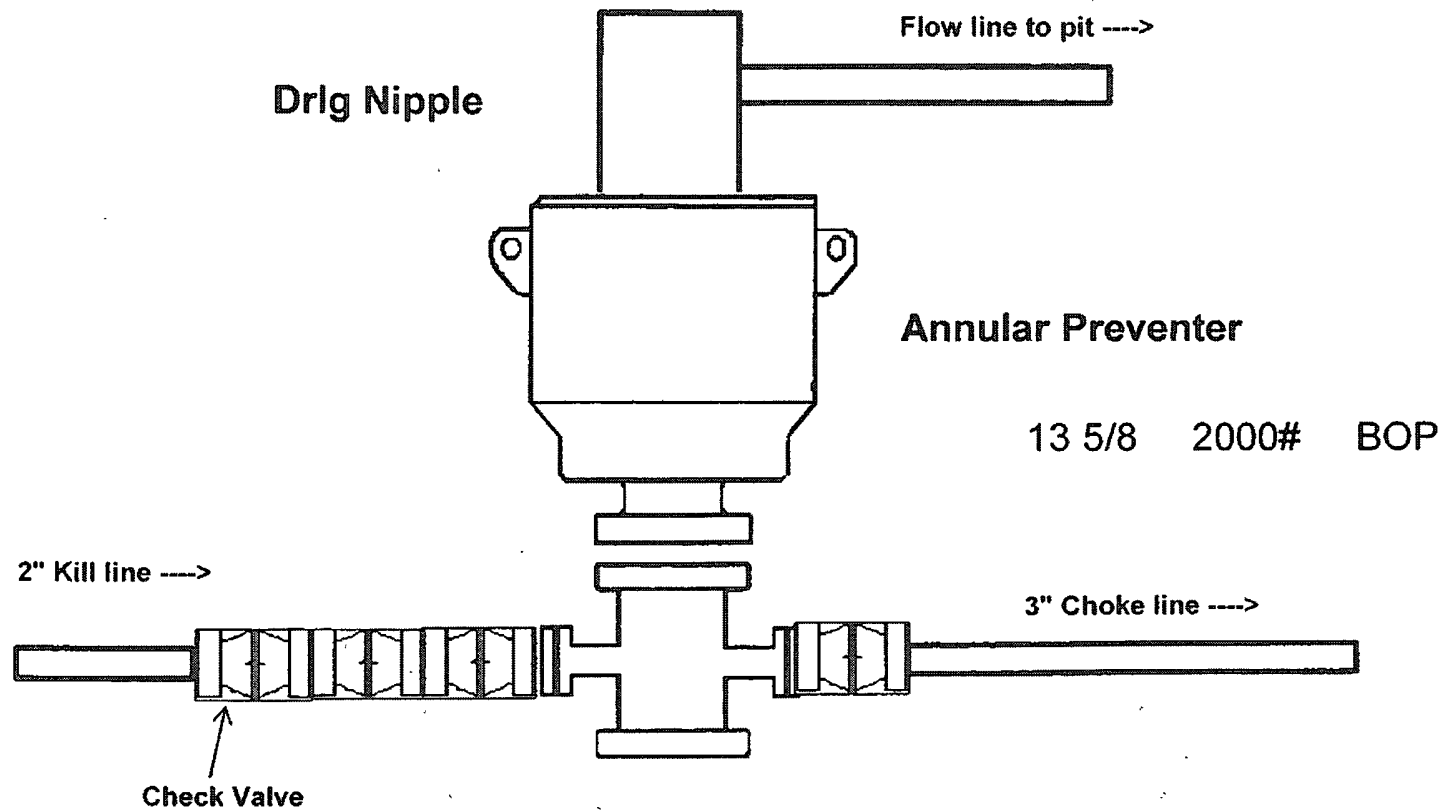
West(-)/East(+) (200 usft/in)



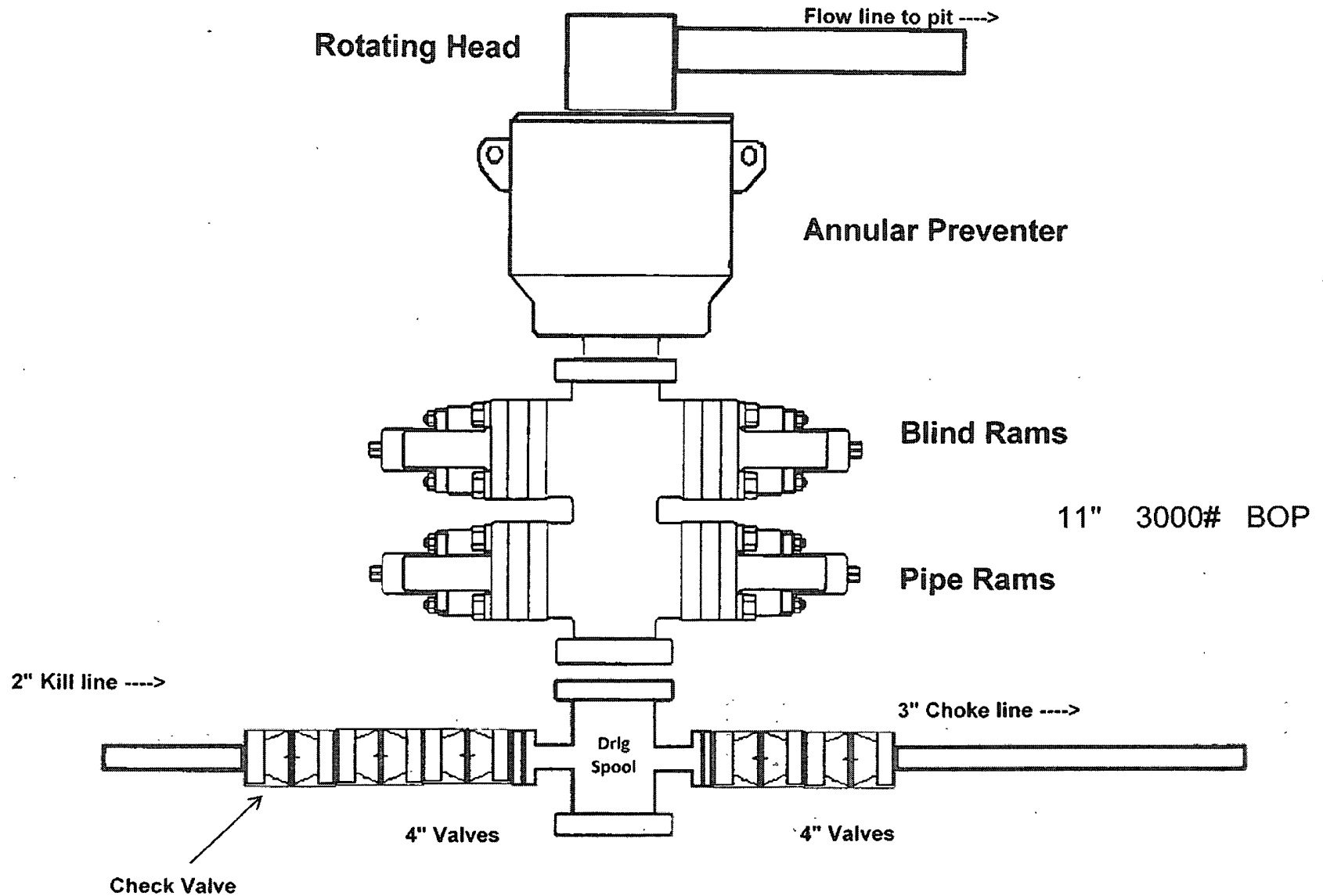
Plan Design #1 (#23H/OH)

Created By: Mike Birmingham Date: 12:32, June 29 2011

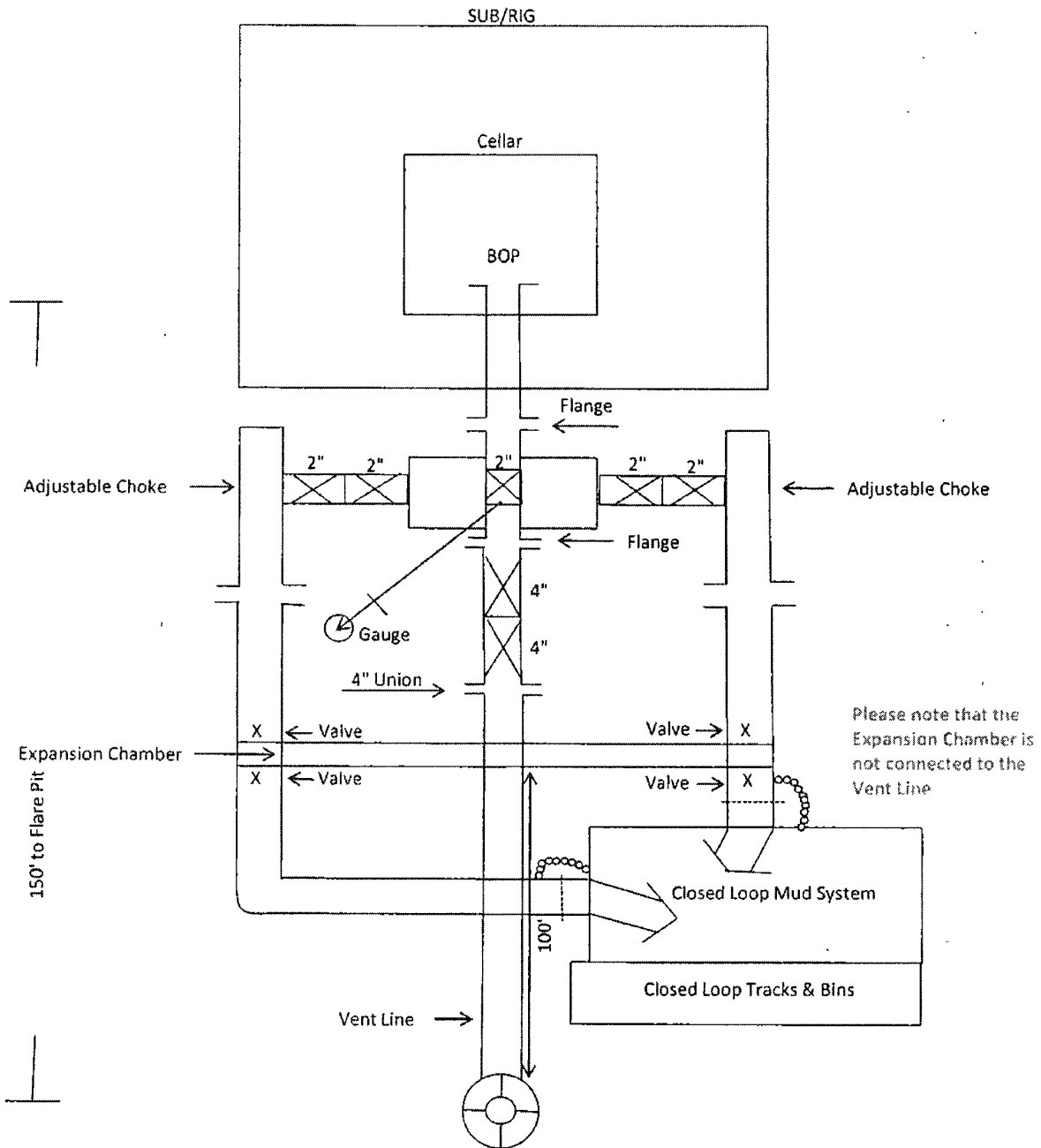
2,000 psi BOP Schematic



3,000 psi BOP Schematic



2M Choke Manifold Equipment



3M Choke Manifold Equipment

