

OCD Hobbs

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

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

HOBBS OCD

JUL 26 2011

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 A #25H	
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		8. Lease Name and Well No. 30816 Lusk Deep Unit A #25H	
2. Name of Operator COG Operating LLC.		9. API Well No. 30-025-40193	
3a. Address 2208 West Main Street Artesia, NM 88210	3b. Phone No. (include area code) 229137 575-748-6940	10. Field and Pool, or Exploratory 11440 Lusk ; Bone Spring West	
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 1800' FNL & 330' FWL Unit Letter E (SWNW) SHL At proposed prod. Zone 1800' FNL & 330' FEL Unit Letter H (SENE) BHL		11. Sec., T.R.M. or Blk and Survey or Area Sec. 20 - 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 drg. Unit line, if any) 330'	16. No. of acres in lease 640	17. Spacing Unit dedicated to this well 160	
18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. 150'	19. Proposed Depth PHTD.9620 TVD 9350 MD 13705	20. BLM/BIA Bond No. on file NMB000740	
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3576	22. Approximate date work will start* ASAP	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 5/23/2011
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Approved by (Signature) <i>/s/ Don Peterson</i>		Name (Printed/Typed) <i>/s/ Don Peterson</i>	Date JUL 19 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.

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)

CAPTAN CONTROLLED WATER BASIN

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

APPROVAL SUBJECT TO
GENERAL REQUIREMENTS AND
SPECIAL STIPULATIONS
ATTACHED

JUL 27 2011

COG Operating LLC
DRILLING AND OPERATIONS PROGRAM

HOBBS OCD

JUL 26 2011

Lusk Deep Unit A #25H
SHL: 1800' FNL & 330' FWL
BHL: 1800' FNL & 330' FEL
Section 20 T19S R32E
Lea County, New Mexico

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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	~ 345'	
Rustler	740'	
Top of Salt	820'	
Base of Salt	2350'	
Yates	2515'	
Seven Rivers	2770'	
Reef	2860'	
Delaware	4750'	Oil
Bone Spring	7085'	
1 st BSS	8345'	Oil
2 nd BSS	9035'	Oil
TD(Pilot)	9620'	
TVD	9350'	
TMD	13,705'	

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 270' 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 2700' (or 100' above top of 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"	See COA 0' - 270' 800	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' - 4650'	Intrmd	9 5/8"	New	40#	STC	J-55	1.125	1.125	1.6
3 3/4"	4650' - 9620'	Pilot Hole								
7 7/8"	0' - 13,705'	Production Curve & Lateral	5 1/2"	New	17#	LTC	P-110	1.125	1.125	1.6

4. Proposed Cement Program

a. 13-3/8" Surface

Lead: 300 sx Class C + Gilsonite + HR-800
(12.7 ppg / 1.88 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 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)

*Possible 2 stage cmt job w/DVT/ECP set @ ~2700'

1st stg: 300 sx lead & 250 sx tail *1.89 + 1.34*

2nd stg: 550 sx lead & 100 sx tail *1.75 + 1.34*

**Calculated w/35% excess on OH volumes

d. 5 1/2" Production

1st Stage:

Lead: 500 sx Class H + Acid soluble
(15.0 ppg / 2.6 cuft/sx)

2nd Stage:

Lead: 750 sx Class H + Bentonite + HALAD-322
(12.7 ppg / 1.89 cuft/sx)

Tail: 100 sx Class H
(15.6 ppg / 1.19 cuft/sx)

DVT @ 8700' (approx depth)

**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 approximately 2700' or 100' above to of Reef.
- After logging the PH, will plug back to kick off point by setting the following plugs:

*See
COA*

Kick Off Plug f/8850' – 9350'

250 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 (Hydriil) 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:

- a. PH TD = 4175 psi
- b. Lateral TD = 4055 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' - 770' 820'	Fresh Water	8.4	29	N.C.
770' - 4650'	Brine	10	29	N.C.
4650' - 9620' (PH)	Cut Brine	8.9 - 9.2	29	N.C.
4650' - 13,705' (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 COA*

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

10. Potential Hazards:

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

11. Anticipated starting date and Duration of Operations:

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



COG Operating LLC

Lea County(NAD27)

Lusk Deep Unit A

#25H

OH

HOBBS OCD

JUL 26 2011

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Plan: Design #1

Pathfinder X & Y Planning Report

08 April, 2011

PATHFINDER

A Schlumberger Company



Pathfinder
Pathfinder X & Y Planning Report



A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #25H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #25H
TVD Reference: WELL @ 3593.00usft (Original Well Elev)
MD Reference: WELL @ 3593.00usft (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	Latitude:	32° 38' 53.339 N
From: Map		Easting:	665,577.000 usft	Longitude:	103° 47' 43.403 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.29 °

Well: #25H

Well Position	+N/-S	0.00 usft	Northing:	599,927.400 usft	Latitude:	32° 38' 53.339 N
	+E/-W	0.00 usft	Easting:	665,577.000 usft	Longitude:	103° 47' 43.403 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,576.00 usft

Wellbore: OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	04/01/11	7.73	60.57	48,902

Design: Design #1

Audit Notes:

Version: Phase: PROTOTYPE Tie On Depth: 0.00

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	89.79

Survey Tool Program Date 04/01/11

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	13,705.74	Design #1 (OH)	MWD	MWD - Standard



Pathfinder
Pathfinder X & Y Planning Report



A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #25H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #25H
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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)
0.00	0.00	0.00	0.00	3,593.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
100.00	0.00	0.00	100.00	3,493.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
200.00	0.00	0.00	200.00	3,393.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
300.00	0.00	0.00	300.00	3,293.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
400.00	0.00	0.00	400.00	3,193.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
500.00	0.00	0.00	500.00	3,093.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
600.00	0.00	0.00	600.00	2,993.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
700.00	0.00	0.00	700.00	2,893.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
800.00	0.00	0.00	800.00	2,793.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
900.00	0.00	0.00	900.00	2,693.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
1,000.00	0.00	0.00	1,000.00	2,593.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
1,100.00	0.00	0.00	1,100.00	2,493.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
1,200.00	0.00	0.00	1,200.00	2,393.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
1,300.00	0.00	0.00	1,300.00	2,293.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
1,400.00	0.00	0.00	1,400.00	2,193.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
1,500.00	0.00	0.00	1,500.00	2,093.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
1,600.00	0.00	0.00	1,600.00	1,993.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
1,700.00	0.00	0.00	1,700.00	1,893.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
1,800.00	0.00	0.00	1,800.00	1,793.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
1,900.00	0.00	0.00	1,900.00	1,693.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
2,000.00	0.00	0.00	2,000.00	1,593.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
2,100.00	0.00	0.00	2,100.00	1,493.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
2,200.00	0.00	0.00	2,200.00	1,393.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
2,300.00	0.00	0.00	2,300.00	1,293.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
2,400.00	0.00	0.00	2,400.00	1,193.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
2,500.00	0.00	0.00	2,500.00	1,093.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
2,600.00	0.00	0.00	2,600.00	993.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00



Pathfinder
Pathfinder X & Y Planning Report



A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #25H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #25H
TVD Reference: WELL @ 3593.00usft (Original Well Elev)
MD Reference: WELL @ 3593.00usft (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)
2,700.00	0.00	0.00	2,700.00	893.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
2,800.00	0.00	0.00	2,800.00	793.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
2,900.00	0.00	0.00	2,900.00	693.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
3,000.00	0.00	0.00	3,000.00	593.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
3,100.00	0.00	0.00	3,100.00	493.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
3,200.00	0.00	0.00	3,200.00	393.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
3,300.00	0.00	0.00	3,300.00	293.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
3,400.00	0.00	0.00	3,400.00	193.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
3,500.00	0.00	0.00	3,500.00	93.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
3,600.00	0.00	0.00	3,600.00	-7.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
3,700.00	0.00	0.00	3,700.00	-107.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
3,800.00	0.00	0.00	3,800.00	-207.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
3,900.00	0.00	0.00	3,900.00	-307.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
4,000.00	0.00	0.00	4,000.00	-407.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
4,100.00	0.00	0.00	4,100.00	-507.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
4,200.00	0.00	0.00	4,200.00	-607.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
4,300.00	0.00	0.00	4,300.00	-707.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
4,400.00	0.00	0.00	4,400.00	-807.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
4,500.00	0.00	0.00	4,500.00	-907.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
4,600.00	0.00	0.00	4,600.00	-1,007.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
4,700.00	0.00	0.00	4,700.00	-1,107.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
4,800.00	0.00	0.00	4,800.00	-1,207.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
4,900.00	0.00	0.00	4,900.00	-1,307.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
5,000.00	0.00	0.00	5,000.00	-1,407.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
5,100.00	0.00	0.00	5,100.00	-1,507.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
5,200.00	0.00	0.00	5,200.00	-1,607.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
5,300.00	0.00	0.00	5,300.00	-1,707.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00



Pathfinder
Pathfinder X & Y Planning Report



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Site: Lusk Deep Unit A
Well: #25H
Wellbore: OH
Design: Design #1

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5,400.00	0.00	0.00	5,400.00	-1,807.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
5,500.00	0.00	0.00	5,500.00	-1,907.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
5,600.00	0.00	0.00	5,600.00	-2,007.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
5,700.00	0.00	0.00	5,700.00	-2,107.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
5,800.00	0.00	0.00	5,800.00	-2,207.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
5,900.00	0.00	0.00	5,900.00	-2,307.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
6,000.00	0.00	0.00	6,000.00	-2,407.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
6,100.00	0.00	0.00	6,100.00	-2,507.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
6,200.00	0.00	0.00	6,200.00	-2,607.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
6,300.00	0.00	0.00	6,300.00	-2,707.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
6,400.00	0.00	0.00	6,400.00	-2,807.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
6,500.00	0.00	0.00	6,500.00	-2,907.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
6,600.00	0.00	0.00	6,600.00	-3,007.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
6,700.00	0.00	0.00	6,700.00	-3,107.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
6,800.00	0.00	0.00	6,800.00	-3,207.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
6,900.00	0.00	0.00	6,900.00	-3,307.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
7,000.00	0.00	0.00	7,000.00	-3,407.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
7,100.00	0.00	0.00	7,100.00	-3,507.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
7,200.00	0.00	0.00	7,200.00	-3,607.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
7,300.00	0.00	0.00	7,300.00	-3,707.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
7,400.00	0.00	0.00	7,400.00	-3,807.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
7,500.00	0.00	0.00	7,500.00	-3,907.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
7,600.00	0.00	0.00	7,600.00	-4,007.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
7,700.00	0.00	0.00	7,700.00	-4,107.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
7,800.00	0.00	0.00	7,800.00	-4,207.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
7,900.00	0.00	0.00	7,900.00	-4,307.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
8,000.00	0.00	0.00	8,000.00	-4,407.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00



Pathfinder
Pathfinder X & Y Planning Report



Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #25H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #25H
TVD Reference: WELL @ 3593.00usft (Original Well Elev)
MD Reference: WELL @ 3593.00usft (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	-4,507.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
8,200.00	0.00	0.00	8,200.00	-4,607.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
8,300.00	0.00	0.00	8,300.00	-4,707.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
8,400.00	0.00	0.00	8,400.00	-4,807.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
8,500.00	0.00	0.00	8,500.00	-4,907.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
8,600.00	0.00	0.00	8,600.00	-5,007.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
8,700.00	0.00	0.00	8,700.00	-5,107.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
8,803.00	0.00	0.00	8,803.00	-5,210.00	0.00	0.00	0.00	0.00	599,927.40	665,577.00
KOP-8803.00°MD,0.00°INC,0.00°AZI,8803.00°TVD										
8,825.00	2.64	89.79	8,824.99	-5,231.99	0.00	0.51	0.51	12.00	599,927.40	665,577.51
8,850.00	5.64	89.79	8,849.92	-5,256.92	0.01	2.31	2.31	12.00	599,927.41	665,579.31
8,875.00	8.64	89.79	8,874.73	-5,281.73	0.02	5.42	5.42	12.00	599,927.42	665,582.42
8,900.00	11.64	89.79	8,899.33	-5,306.33	0.04	9.82	9.82	12.00	599,927.44	665,586.82
8,925.00	14.64	89.79	8,923.68	-5,330.68	0.06	15.50	15.50	12.00	599,927.46	665,592.50
8,950.00	17.64	89.79	8,947.69	-5,354.69	0.08	22.45	22.45	12.00	599,927.48	665,599.45
8,975.00	20.64	89.79	8,971.30	-5,378.30	0.11	30.65	30.65	12.00	599,927.51	665,607.65
9,000.00	23.64	89.79	8,994.46	-5,401.46	0.15	40.07	40.07	12.00	599,927.55	665,617.07
9,025.00	26.64	89.79	9,017.09	-5,424.09	0.19	50.69	50.69	12.00	599,927.59	665,627.69
9,050.00	29.64	89.79	9,039.13	-5,446.13	0.23	62.48	62.48	12.00	599,927.63	665,639.48
9,075.00	32.64	89.79	9,060.52	-5,467.52	0.28	75.40	75.40	12.00	599,927.68	665,652.40
9,100.00	35.64	89.79	9,081.21	-5,488.21	0.33	89.43	89.43	12.00	599,927.73	665,666.43
9,125.00	38.64	89.79	9,101.14	-5,508.14	0.38	104.52	104.52	12.00	599,927.78	665,681.52
9,150.00	41.64	89.79	9,120.25	-5,527.25	0.44	120.64	120.64	12.00	599,927.84	665,697.64
9,175.00	44.64	89.79	9,138.49	-5,545.49	0.50	137.73	137.73	12.00	599,927.90	665,714.73
9,200.00	47.64	89.79	9,155.81	-5,562.81	0.57	155.75	155.76	12.00	599,927.97	665,732.75
9,225.00	50.64	89.79	9,172.16	-5,579.16	0.64	174.66	174.66	12.00	599,928.04	665,751.66
9,250.00	53.64	89.79	9,187.51	-5,594.51	0.71	194.40	194.40	12.00	599,928.11	665,771.40



Pathfinder
Pathfinder X & Y Planning Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #25H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #25H
TVD Reference: WELL @ 3593.00usft (Original Well Elev)
MD Reference: WELL @ 3593.00usft (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)
9,275.00	56.64	89.79	9,201.79	-5,608.79	0.79	214.91	214.91	12.00	599,928.19	665,791.91
9,300.00	59.64	89.79	9,214.99	-5,621.99	0.87	236.14	236.14	12.00	599,928.27	665,813.14
9,325.00	62.64	89.79	9,227.05	-5,634.05	0.95	258.03	258.03	12.00	599,928.35	665,835.03
9,350.00	65.64	89.79	9,237.96	-5,644.96	1.03	280.52	280.53	12.00	599,928.43	665,857.52
9,375.00	68.64	89.79	9,247.67	-5,654.67	1.11	303.56	303.56	12.00	599,928.51	665,880.56
9,400.00	71.64	89.79	9,256.16	-5,663.16	1.20	327.07	327.07	12.00	599,928.60	665,904.07
9,425.00	74.64	89.79	9,263.41	-5,670.41	1.29	350.99	350.99	12.00	599,928.69	665,927.99
9,450.00	77.64	89.79	9,269.40	-5,676.40	1.38	375.26	375.26	12.00	599,928.78	665,952.26
9,475.00	80.64	89.79	9,274.11	-5,681.11	1.47	399.81	399.81	12.00	599,928.87	665,976.81
9,500.00	83.64	89.79	9,277.53	-5,684.53	1.56	424.57	424.57	12.00	599,928.96	666,001.57
9,525.00	86.64	89.79	9,279.64	-5,686.64	1.65	449.48	449.48	12.00	599,929.05	666,026.48
9,545.00	89.04	89.79	9,280.40	-5,687.40	1.72	469.46	469.47	12.00	599,929.12	666,046.46
EOC-9545.00°MD,89.04°INC,89.79°AZI,9280.40°TVD										
9,600.00	89.04	89.79	9,281.32	-5,688.32	1.92	524.45	524.46	0.00	599,929.32	666,101.45
9,700.00	89.04	89.79	9,282.99	-5,689.99	2.29	624.44	624.44	0.00	599,929.69	666,201.44
9,800.00	89.04	89.79	9,284.67	-5,691.67	2.66	724.42	724.43	0.00	599,930.06	666,301.42
9,900.00	89.04	89.79	9,286.35	-5,693.35	3.02	824.41	824.42	0.00	599,930.42	666,401.41
10,000.00	89.04	89.79	9,288.02	-5,695.02	3.39	924.40	924.40	0.00	599,930.79	666,501.40
10,100.00	89.04	89.79	9,289.70	-5,696.70	3.75	1,024.38	1,024.39	0.00	599,931.15	666,601.38
10,200.00	89.04	89.79	9,291.37	-5,698.37	4.12	1,124.37	1,124.37	0.00	599,931.52	666,701.37
10,300.00	89.04	89.79	9,293.05	-5,700.05	4.49	1,224.35	1,224.36	0.00	599,931.89	666,801.35
10,400.00	89.04	89.79	9,294.72	-5,701.72	4.85	1,324.34	1,324.35	0.00	599,932.25	666,901.34
10,500.00	89.04	89.79	9,296.40	-5,703.40	5.22	1,424.32	1,424.33	0.00	599,932.62	667,001.32
10,600.00	89.04	89.79	9,298.07	-5,705.07	5.59	1,524.31	1,524.32	0.00	599,932.99	667,101.31
10,700.00	89.04	89.79	9,299.75	-5,706.75	5.95	1,624.29	1,624.30	0.00	599,933.35	667,201.29
10,800.00	89.04	89.79	9,301.42	-5,708.42	6.32	1,724.28	1,724.29	0.00	599,933.72	667,301.28
10,900.00	89.04	89.79	9,303.10	-5,710.10	6.69	1,824.26	1,824.28	0.00	599,934.09	667,401.26



Pathfinder
Pathfinder X & Y Planning Report



A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #25H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #25H
TVD Reference: WELL @ 3593.00usft (Original Well Elev)
MD Reference: WELL @ 3593.00usft (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)
11,000.00	89.04	89.79	9,304.78	-5,711.78	7.05	1,924.25	1,924.26	0.00	599,934.45	667,501.25
11,100.00	89.04	89.79	9,306.45	-5,713.45	7.42	2,024.23	2,024.25	0.00	599,934.82	667,601.23
11,200.00	89.04	89.79	9,308.13	-5,715.13	7.79	2,124.22	2,124.23	0.00	599,935.19	667,701.22
11,300.00	89.04	89.79	9,309.80	-5,716.80	8.15	2,224.20	2,224.22	0.00	599,935.55	667,801.20
11,400.00	89.04	89.79	9,311.48	-5,718.48	8.52	2,324.19	2,324.20	0.00	599,935.92	667,901.19
11,500.00	89.04	89.79	9,313.15	-5,720.15	8.89	2,424.17	2,424.19	0.00	599,936.29	668,001.17
11,600.00	89.04	89.79	9,314.83	-5,721.83	9.25	2,524.16	2,524.18	0.00	599,936.65	668,101.16
11,700.00	89.04	89.79	9,316.50	-5,723.50	9.62	2,624.15	2,624.16	0.00	599,937.02	668,201.15
11,800.00	89.04	89.79	9,318.18	-5,725.18	9.98	2,724.13	2,724.15	0.00	599,937.38	668,301.13
11,900.00	89.04	89.79	9,319.85	-5,726.85	10.35	2,824.12	2,824.13	0.00	599,937.75	668,401.12
12,000.00	89.04	89.79	9,321.53	-5,728.53	10.72	2,924.10	2,924.12	0.00	599,938.12	668,501.10
12,100.00	89.04	89.79	9,323.21	-5,730.21	11.08	3,024.09	3,024.11	0.00	599,938.48	668,601.09
12,200.00	89.04	89.79	9,324.88	-5,731.88	11.45	3,124.07	3,124.09	0.00	599,938.85	668,701.07
12,300.00	89.04	89.79	9,326.56	-5,733.56	11.82	3,224.06	3,224.08	0.00	599,939.22	668,801.06
12,400.00	89.04	89.79	9,328.23	-5,735.23	12.18	3,324.04	3,324.06	0.00	599,939.58	668,901.04
12,500.00	89.04	89.79	9,329.91	-5,736.91	12.55	3,424.03	3,424.05	0.00	599,939.95	669,001.03
12,600.00	89.04	89.79	9,331.58	-5,738.58	12.92	3,524.01	3,524.04	0.00	599,940.32	669,101.01
12,700.00	89.04	89.79	9,333.26	-5,740.26	13.28	3,624.00	3,624.02	0.00	599,940.68	669,201.00
12,800.00	89.04	89.79	9,334.93	-5,741.93	13.65	3,723.98	3,724.01	0.00	599,941.05	669,300.98
12,900.00	89.04	89.79	9,336.61	-5,743.61	14.02	3,823.97	3,823.99	0.00	599,941.42	669,400.97
13,000.00	89.04	89.79	9,338.28	-5,745.28	14.38	3,923.95	3,923.98	0.00	599,941.78	669,500.95
13,100.00	89.04	89.79	9,339.96	-5,746.96	14.75	4,023.94	4,023.97	0.00	599,942.15	669,600.94
13,200.00	89.04	89.79	9,341.64	-5,748.64	15.12	4,123.92	4,123.95	0.00	599,942.52	669,700.92
13,300.00	89.04	89.79	9,343.31	-5,750.31	15.48	4,223.91	4,223.94	0.00	599,942.88	669,800.91
13,400.00	89.04	89.79	9,344.99	-5,751.99	15.85	4,323.90	4,323.92	0.00	599,943.25	669,900.90
13,500.00	89.04	89.79	9,346.66	-5,753.66	16.21	4,423.88	4,423.91	0.00	599,943.61	670,000.88
13,600.00	89.04	89.79	9,348.34	-5,755.34	16.58	4,523.87	4,523.90	0.00	599,943.98	670,100.87



Pathfinder
Pathfinder X & Y Planning Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #25H
Wellbore: OH
Design: Design #1

Local Co-ordinate Reference: Well #25H
TVD Reference: WELL @ 3593.00usft (Original Well Elev)
MD Reference: WELL @ 3593.00usft (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)
13,705.75	89.04	89.79	9,350.11	-5,757.11	16.97	4,629.60	4,629.63	0.00	599,944.37	670,206.60

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
8,803.00	8,803.00	0.00	0.00	KOP-8803.00'MD,0.00°INC,0.00°AZI,8803.00'TVD
9,545.00	9,280.40	1.72	469.46	EOC-9545.00'MD,89.04°INC,89.79°AZI,9280.40'TVD
13,705.75	9,350.11	16.97	4,629.60	TD at 13705.75

Checked By: _____ Approved By: _____ Date: _____



Azimuths to Grid North
True North: -0.29°
Magnetic North: 7.44°

Magnetic Field
Strength: 48902.0snT
Dip Angle: 60.57°
Date: 04/01/2011
Model: IGRF200510

PATHFINDER

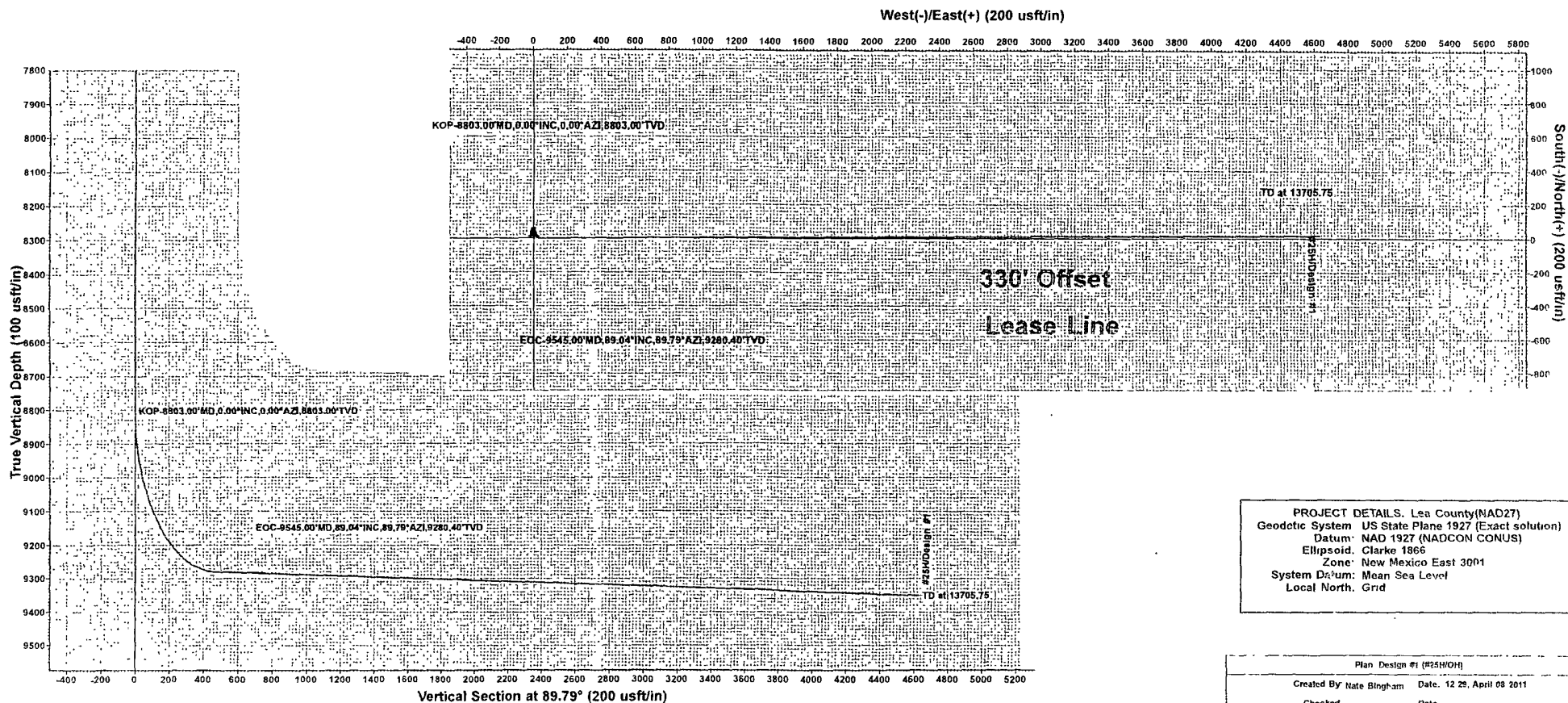
A Schlumberger Company

Project: Lea County(NAD27)
Site: Lusk Deep Unit A
Well: #25H
Wellbore: OH
Plan: Design #1 (#25H/OH)

WELL DETAILS #25H							
Ground Elevation		3576.00					
RKB Elevation		WELL @ 3593.00usft (Original Well Elev)					
Rig Name		Original Well Elev					
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot	
0.00	0.00	599927.400	665577.000	32° 36' 53.339 N	103° 47' 43.403 W		

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
BHL (Devastator20Fed#2H)	9350.00	17.10	4629.60	599944.500	670206.600	Point

SECTION DETAILS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8803.00	0.00	0.00	8803.00	0.00	0.00	0.00	0.00	0.00	
9545.00	89.04	89.79	9280.40	1.72	469.46	12.00	89.79	469.47	
13705.75	89.04	89.79	9350.11	16.97	4629.60	0.00	0.00	4629.63	BHL (Devastator20Fed#2H)



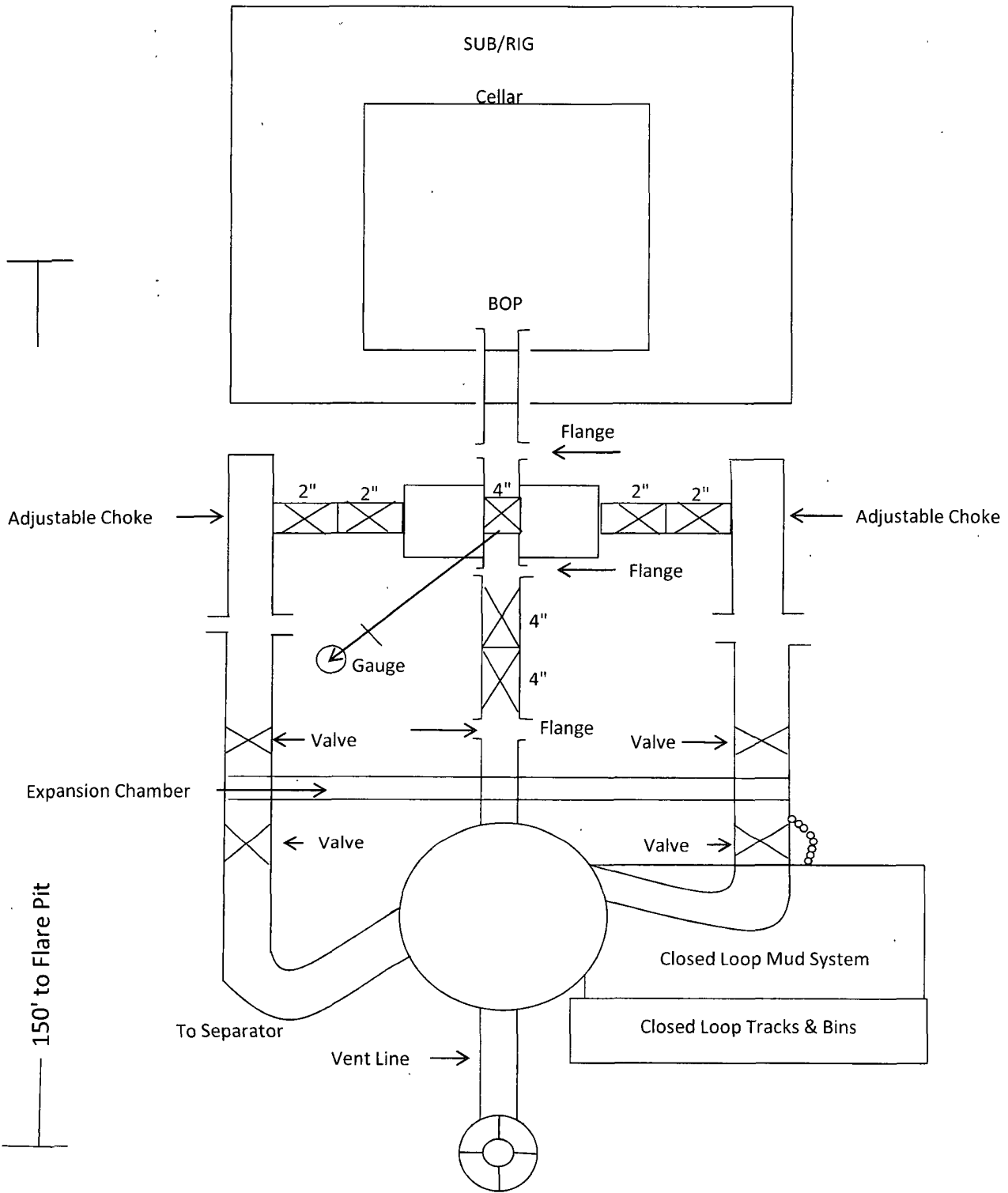
PROJECT DETAILS: Lea County(NAD27)
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid

Plan Design #1 (#25H/OH)

Created By: Nate Bingham Date: 12/28/2011

Checked: _____ Date: _____

3M Choke Manifold Equipment



2M Choke Manifold Equipment

