

I&E - HOBBS
HOBBS OCD

ATS-12-435

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

JUN 19 2012

RECEIVED

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of Work: ☒ DRILL ☐ REENTER		5. Lease Serial No. SHL: NMNM104076 BHL: NMNM112932
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		6. If Indian, Allottee or Tribe Name
2. Name of Operator COG Operating LLC.		7. If Unit or CA Agreement, Name and No.
3a. Address 2208 West Main Street Artesia, NM 88210		8. Lease Name and Well No. 39286 Warhawk 3 Federal Com #1H
3b. Phone No. (include area code) 575-748-6940		9. API Well No. 30-025-40635
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 780' FNL & 170' FWL Unit Letter D (NWNW) SHL At proposed prod. Zone 380' FNL & 330' FEL Unit Letter A (NENE) BHL		10. Field and Pool, or Exploratory 41442 Lusk - Wildcat, Bone Spring, East
14. Distance in miles and direction from nearest town or post office* About 10 miles from Maljamar		11. Sec., T.R.M. or Bk and Survey or Area Sec. 3 - T19S - R32E
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any) 170'	16. No. of acres in lease SHL: 160 BHL: 160	12. County or Parish Lea, County
17. Spacing Unit dedicated to this well 160	18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. About 500'	13. State NM
19. Proposed Depth TVD: 9480' MD: 14058' PH: 9820'	20. BLM/BIA Bond No. on file NM 600025 NMB000740	
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3684.3	22. Approximate date work will start* 4/15/2012	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:

- 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.

25. Signature <i>Mayte Reyes</i>	Name (Printed/Typed) Mayte Reyes	Date 2/27/2012
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Title Regulatory Analyst	
Approved by (Signature) <i>/s/ Don Peterson</i>	Name (Printed/Typed) CARI SBAD FIELD OFFICE
Title FIELD MANAGER	Office CARI SBAD FIELD OFFICE

Application approval does not warrant conduct operations thereon.
Conditions of approval, if any, are atta

OCD CONDITION OF APPROVAL of Drilling:
Intent to drill ONLY --- CANNOT produce until the Non-Standard Location has been approved by OCD Santa Fe office

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 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)

Witness Surface &
Intermediate Casing

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

CAPITAN CONTROLLED WATER BASIN

APPROVAL SUBJECT TO
GENERAL REQUIREMENTS AND
SPECIAL STIPULATIONS
ATTACHED

JUN 21 2012

COG Operating LLC
DRILLING AND OPERATIONS PROGRAM
Warhawk 3 Federal #1H
SHL: 780' FNL & 170' FWL
BHL: 380' FNL & 330' FEL
Section 3 T19S R32E
Eddy 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'	
Rustler	1250'	
Top of Salt	1300'	
Base of Salt	2850'	
Yates	2940'	
7 Rivers	3260'	
Queen	3750'	
Delaware	5427'	Oil
Bone Spring	7110'	
1 st BSS	8389'	Oil
2 nd BSS	9217'	Oil
PHTD	9820'	
TD TVD	9480'	
TD MD	14,058'	

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 ~~1275'~~ and circulating cement back to surface. All intervals will be isolated by setting 5 1/2" casing to total depth and tying cement back to 200' inside 9-5/8" casing shoe.

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' - 1275' 1350'	Surface	13 3/8"	New	54.5#	STC	J-55	1.125	1.125	1.6
12 1/4"	0' - 2900'	Intrmd	9 5/8"	New	36#	STC	J-55	1.125	1.125	1.6
7 7/8"	2900' - 9820'	Pilot Hole								
7 7/8"	0' - 14,058'	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: 600 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: 500 sx Class C + 4% Gel
(13.5 ppg / 1.75 cuft/sx)
- Tail: 250 sx Class C + 2% CaCl₂
(14.8 ppg / 1.35 cuft/sx)
- **Calculated w/35% excess on OH volumes
- c. 5 1/2" Production
- Lead: 1150 sx 35:65:6 H + Salt+Gilsonite+CFR-3+ HR601
(12.7 ppg / 1.89 cuft/sx)
- Tail: 900 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 is design to circulate to surface.
 - After logging the PH, will plug back to kick off point by setting the following plug:
PH TD/Kick off Plug:
8950' – 9820'
300 sx Class H + HR-800 @ 17.2 ppg/0.98 ft³/sx

5. Minimum Specifications for Pressure Control:

Nipple up on 13 3/8 with 2M system tested to 50% of rating working pressure by independent tester.

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

PH TD = 4290 psi

Lateral TD = 4140 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' - 1275' 1350'	Fresh Water	8.4	29	N.C.
1275' - 2900'	Brine	10	29	N.C.
2900' - 9820' (PH)	Cut Brine	8.9 - 9.2	29	N.C.
2900' - 14,058' (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 COA*

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



COG Operating LLC

Lea County, NM (NAD 83)

Warhawk "3" Federal

#1H

OH

Plan: Plan #1

Pathfinder X & Y Report

31 October, 2011



A Schlumberger Company



Smith International, Inc.
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County, NM (NAD 83)
Site: Warhawk "3" Federal
Well: #1H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #1H
TVD Reference: KB = 17' @ 3701.3usft (Original Well Elev)
MD Reference: KB = 17' @ 3701.3usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Project	Lea County, NM (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Warhawk "3" Federal		
Site Position:	From: Map	Northing: 616,888.64 usft	Latitude: 32° 41' 40.449 N
		Easting: 717,045.81 usft	Longitude: 103° 45' 43.801 W
Position Uncertainty:	0.0 usft	Slot Radius: 13-3/16 "	Grid Convergence: 0.31 °

Well	#1H		
Well Position	+N/-S 0.0 usft	Northing: 616,888.64 usft	Latitude: 32° 41' 40.449 N
	+E/-W 0.0 usft	Easting: 717,045.81 usft	Longitude: 103° 45' 43.801 W
Position Uncertainty	0.0 usft	Wellhead Elevation: usft	Ground Level: 3,684.3 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	10/29/2011	(°) 7.66
			Dip Angle (°) 60.58
			Field Strength (nT) 48,840

Design	Plan #1		
Audit Notes:			
Version:	Phase: PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.0	0.0	0.0
			Direction (°) 85.04

Survey Tool Program	Date	10/29/2011		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	14,058.1	Plan #1 (OH)		



Smith International, Inc.

Pathfinder X & Y Report



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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)
0.0	0.00	0.00	0.0	-3,701.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
100.0	0.00	0.00	100.0	-3,601.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
200.0	0.00	0.00	200.0	-3,501.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
300.0	0.00	0.00	300.0	-3,401.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
400.0	0.00	0.00	400.0	-3,301.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
500.0	0.00	0.00	500.0	-3,201.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
600.0	0.00	0.00	600.0	-3,101.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
700.0	0.00	0.00	700.0	-3,001.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
800.0	0.00	0.00	800.0	-2,901.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
900.0	0.00	0.00	900.0	-2,801.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
1,000.0	0.00	0.00	1,000.0	-2,701.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
1,100.0	0.00	0.00	1,100.0	-2,601.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
1,200.0	0.00	0.00	1,200.0	-2,501.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
1,300.0	0.00	0.00	1,300.0	-2,401.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
1,400.0	0.00	0.00	1,400.0	-2,301.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
1,500.0	0.00	0.00	1,500.0	-2,201.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
1,600.0	0.00	0.00	1,600.0	-2,101.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
1,700.0	0.00	0.00	1,700.0	-2,001.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
1,800.0	0.00	0.00	1,800.0	-1,901.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
1,900.0	0.00	0.00	1,900.0	-1,801.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
2,000.0	0.00	0.00	2,000.0	-1,701.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
2,100.0	0.00	0.00	2,100.0	-1,601.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
2,200.0	0.00	0.00	2,200.0	-1,501.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
2,300.0	0.00	0.00	2,300.0	-1,401.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
2,400.0	0.00	0.00	2,400.0	-1,301.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
2,500.0	0.00	0.00	2,500.0	-1,201.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
2,600.0	0.00	0.00	2,600.0	-1,101.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81



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Pathfinder X & Y Report



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2,700.0	0.00	0.00	2,700.0	-1,001.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
2,800.0	0.00	0.00	2,800.0	-901.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
2,900.0	0.00	0.00	2,900.0	-801.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
3,000.0	0.00	0.00	3,000.0	-701.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
3,100.0	0.00	0.00	3,100.0	-601.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
3,200.0	0.00	0.00	3,200.0	-501.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
3,300.0	0.00	0.00	3,300.0	-401.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
3,400.0	0.00	0.00	3,400.0	-301.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
3,500.0	0.00	0.00	3,500.0	-201.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
3,600.0	0.00	0.00	3,600.0	-101.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
3,700.0	0.00	0.00	3,700.0	-1.3	0.0	0.0	0.0	0.00	616,888.64	717,045.81
3,800.0	0.00	0.00	3,800.0	98.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
3,900.0	0.00	0.00	3,900.0	198.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
4,000.0	0.00	0.00	4,000.0	298.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
4,100.0	0.00	0.00	4,100.0	398.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
4,200.0	0.00	0.00	4,200.0	498.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
4,300.0	0.00	0.00	4,300.0	598.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
4,400.0	0.00	0.00	4,400.0	698.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
4,500.0	0.00	0.00	4,500.0	798.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
4,600.0	0.00	0.00	4,600.0	898.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
4,700.0	0.00	0.00	4,700.0	998.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
4,800.0	0.00	0.00	4,800.0	1,098.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
4,900.0	0.00	0.00	4,900.0	1,198.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
5,000.0	0.00	0.00	5,000.0	1,298.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
5,100.0	0.00	0.00	5,100.0	1,398.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
5,200.0	0.00	0.00	5,200.0	1,498.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
5,300.0	0.00	0.00	5,300.0	1,598.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81



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Pathfinder X & Y Report



A Schlumberger Company

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Project: Lea County, NM (NAD 83)
Site: Warhawk "3" Federal
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Wellbore: OH
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Local Co-ordinate Reference: Well #1H
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5,400.0	0.00	0.00	5,400.0	1,698.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
5,500.0	0.00	0.00	5,500.0	1,798.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
5,600.0	0.00	0.00	5,600.0	1,898.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
5,700.0	0.00	0.00	5,700.0	1,998.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
5,800.0	0.00	0.00	5,800.0	2,098.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
5,900.0	0.00	0.00	5,900.0	2,198.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
6,000.0	0.00	0.00	6,000.0	2,298.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
6,100.0	0.00	0.00	6,100.0	2,398.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
6,200.0	0.00	0.00	6,200.0	2,498.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
6,300.0	0.00	0.00	6,300.0	2,598.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
6,400.0	0.00	0.00	6,400.0	2,698.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
6,500.0	0.00	0.00	6,500.0	2,798.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
6,600.0	0.00	0.00	6,600.0	2,898.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
6,700.0	0.00	0.00	6,700.0	2,998.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
6,800.0	0.00	0.00	6,800.0	3,098.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
6,900.0	0.00	0.00	6,900.0	3,198.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
7,000.0	0.00	0.00	7,000.0	3,298.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
7,100.0	0.00	0.00	7,100.0	3,398.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
7,200.0	0.00	0.00	7,200.0	3,498.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
7,300.0	0.00	0.00	7,300.0	3,598.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
7,400.0	0.00	0.00	7,400.0	3,698.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
7,500.0	0.00	0.00	7,500.0	3,798.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
7,600.0	0.00	0.00	7,600.0	3,898.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
7,700.0	0.00	0.00	7,700.0	3,998.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
7,800.0	0.00	0.00	7,800.0	4,098.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
7,900.0	0.00	0.00	7,900.0	4,198.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
8,000.0	0.00	0.00	8,000.0	4,298.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81



Smith International, Inc.
Pathfinder X & Y Report



Company: COG Operating LLC
Project: Lea County, NM (NAD 83)
Site: Warhawk "3" Federal
Well: #1H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #1H
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MD Reference: KB = 17' @ 3701.3usft (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)
8,100.0	0.00	0.00	8,100.0	4,398.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
8,200.0	0.00	0.00	8,200.0	4,498.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
8,300.0	0.00	0.00	8,300.0	4,598.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
8,400.0	0.00	0.00	8,400.0	4,698.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
8,500.0	0.00	0.00	8,500.0	4,798.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
8,600.0	0.00	0.00	8,600.0	4,898.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
8,700.0	0.00	0.00	8,700.0	4,998.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
8,800.0	0.00	0.00	8,800.0	5,098.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
8,900.0	0.00	0.00	8,900.0	5,198.7	0.0	0.0	0.0	0.00	616,888.64	717,045.81
8,985.5	0.00	0.00	8,985.5	5,284.2	0.0	0.0	0.0	0.00	616,888.64	717,045.81
9,000.0	1.74	85.04	9,000.0	5,298.7	0.0	0.2	0.2	12.00	616,888.66	717,046.03
9,025.0	4.74	85.04	9,025.0	5,323.7	0.1	1.6	1.6	12.00	616,888.78	717,047.44
9,050.0	7.74	85.04	9,049.8	5,348.5	0.4	4.3	4.3	12.00	616,889.02	717,050.14
9,075.0	10.74	85.04	9,074.5	5,373.2	0.7	8.3	8.4	12.00	616,889.36	717,054.14
9,100.0	13.74	85.04	9,098.9	5,397.6	1.2	13.6	13.7	12.00	616,889.82	717,059.42
9,125.0	16.74	85.04	9,123.0	5,421.7	1.7	20.2	20.2	12.00	616,890.39	717,065.97
9,150.0	19.74	85.04	9,146.8	5,445.5	2.4	28.0	28.1	12.00	616,891.06	717,073.76
9,175.0	22.74	85.04	9,170.1	5,468.8	3.2	37.0	37.1	12.00	616,891.85	717,082.79
9,200.0	25.74	85.04	9,192.9	5,491.6	4.1	47.2	47.4	12.00	616,892.73	717,093.01
9,225.0	28.74	85.04	9,215.1	5,513.8	5.1	58.6	58.8	12.00	616,893.72	717,104.41
9,250.0	31.74	85.04	9,236.7	5,535.4	6.2	71.1	71.4	12.00	616,894.81	717,116.95
9,275.0	34.74	85.04	9,257.6	5,556.3	7.4	84.8	85.1	12.00	616,895.99	717,130.60
9,300.0	37.74	85.04	9,277.7	5,576.4	8.6	99.5	99.9	12.00	616,897.27	717,145.32
9,325.0	40.74	85.04	9,297.1	5,595.8	10.0	115.3	115.7	12.00	616,898.64	717,161.08
9,350.0	43.74	85.04	9,315.6	5,614.3	11.5	132.0	132.5	12.00	616,900.09	717,177.82
9,375.0	46.74	85.04	9,333.2	5,631.9	13.0	149.7	150.3	12.00	616,901.62	717,195.50
9,400.0	49.74	85.04	9,349.9	5,648.6	14.6	168.3	168.9	12.00	616,903.24	717,214.08



Smith International, Inc.
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
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Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #1H
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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)
9,425.0	52.74	85.04	9,365.5	5,664.2	16.3	187.7	188.4	12.00	616,904.92	717,233.50
9,450.0	55.74	85.04	9,380.1	5,678.8	18.0	207.9	208.7	12.00	616,906.67	717,253.71
9,475.0	58.74	85.04	9,393.6	5,692.3	19.8	228.8	229.7	12.00	616,908.49	717,274.65
9,500.0	61.74	85.04	9,406.1	5,704.8	21.7	250.5	251.4	12.00	616,910.36	717,296.27
9,525.0	64.74	85.04	9,417.3	5,716.0	23.7	272.7	273.7	12.00	616,912.29	717,318.50
9,550.0	67.74	85.04	9,427.4	5,726.1	25.6	295.5	296.6	12.00	616,914.27	717,341.30
9,575.0	70.74	85.04	9,436.2	5,734.9	27.6	318.8	320.0	12.00	616,916.29	717,364.58
9,600.0	73.74	85.04	9,443.9	5,742.6	29.7	342.5	343.8	12.00	616,918.35	717,388.30
9,625.0	76.74	85.04	9,450.2	5,748.9	31.8	366.6	367.9	12.00	616,920.44	717,412.38
9,650.0	79.74	85.04	9,455.3	5,754.0	33.9	391.0	392.4	12.00	616,922.55	717,436.76
9,675.0	82.74	85.04	9,459.1	5,757.8	36.0	415.6	417.1	12.00	616,924.69	717,461.38
9,700.0	85.74	85.04	9,461.6	5,760.3	38.2	440.3	442.0	12.00	616,926.83	717,486.15
9,725.0	88.74	85.04	9,462.8	5,761.5	40.4	465.2	467.0	12.00	616,928.99	717,511.03
9,733.6	89.77	85.04	9,463.0	5,761.7	41.1	473.8	475.6	12.00	616,929.74	717,519.61
9,800.0	89.77	85.04	9,463.2	5,761.9	46.8	539.9	542.0	0.00	616,935.47	717,585.75
9,900.0	89.77	85.04	9,463.6	5,762.3	55.5	639.6	642.0	0.00	616,944.11	717,685.37
10,000.0	89.77	85.04	9,464.0	5,762.7	64.1	739.2	742.0	0.00	616,952.76	717,785.00
10,100.0	89.77	85.04	9,464.4	5,763.1	72.8	838.8	842.0	0.00	616,961.40	717,884.62
10,200.0	89.77	85.04	9,464.8	5,763.5	81.4	938.4	942.0	0.00	616,970.04	717,984.25
10,300.0	89.77	85.04	9,465.2	5,763.9	90.0	1,038.1	1,042.0	0.00	616,978.68	718,083.87
10,400.0	89.77	85.04	9,465.6	5,764.3	98.7	1,137.7	1,142.0	0.00	616,987.32	718,183.50
10,500.0	89.77	85.04	9,466.0	5,764.7	107.3	1,237.3	1,242.0	0.00	616,995.96	718,283.12
10,600.0	89.77	85.04	9,466.4	5,765.1	116.0	1,336.9	1,342.0	0.00	617,004.60	718,382.75
10,700.0	89.77	85.04	9,466.8	5,765.5	124.6	1,436.6	1,442.0	0.00	617,013.24	718,482.37
10,800.0	89.77	85.04	9,467.2	5,765.9	133.2	1,536.2	1,542.0	0.00	617,021.89	718,582.00
10,900.0	89.77	85.04	9,467.6	5,766.3	141.9	1,635.8	1,642.0	0.00	617,030.53	718,681.62
11,000.0	89.77	85.04	9,468.0	5,766.7	150.5	1,735.4	1,742.0	0.00	617,039.17	718,781.25



Smith International, Inc.
Pathfinder X & Y Report



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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)
11,100.0	89.77	85.04	9,468.3	5,767.0	159.2	1,835.1	1,842.0	0.00	617,047.81	718,880.87
11,200.0	89.77	85.04	9,468.7	5,767.4	167.8	1,934.7	1,942.0	0.00	617,056.45	718,980.50
11,300.0	89.77	85.04	9,469.1	5,767.8	176.5	2,034.3	2,042.0	0.00	617,065.09	719,080.12
11,400.0	89.77	85.04	9,469.5	5,768.2	185.1	2,133.9	2,142.0	0.00	617,073.73	719,179.75
11,500.0	89.77	85.04	9,469.9	5,768.6	193.7	2,233.6	2,242.0	0.00	617,082.38	719,279.37
11,600.0	89.77	85.04	9,470.3	5,769.0	202.4	2,333.2	2,342.0	0.00	617,091.02	719,379.00
11,700.0	89.77	85.04	9,470.7	5,769.4	211.0	2,432.8	2,441.9	0.00	617,099.66	719,478.63
11,800.0	89.77	85.04	9,471.1	5,769.8	219.7	2,532.4	2,541.9	0.00	617,108.30	719,578.25
11,900.0	89.77	85.04	9,471.5	5,770.2	228.3	2,632.1	2,641.9	0.00	617,116.94	719,677.88
12,000.0	89.77	85.04	9,471.9	5,770.6	236.9	2,731.7	2,741.9	0.00	617,125.58	719,777.50
12,100.0	89.77	85.04	9,472.3	5,771.0	245.6	2,831.3	2,841.9	0.00	617,134.22	719,877.13
12,200.0	89.77	85.04	9,472.7	5,771.4	254.2	2,930.9	2,941.9	0.00	617,142.86	719,976.75
12,300.0	89.77	85.04	9,473.1	5,771.8	262.9	3,030.6	3,041.9	0.00	617,151.51	720,076.38
12,400.0	89.77	85.04	9,473.5	5,772.2	271.5	3,130.2	3,141.9	0.00	617,160.15	720,176.00
12,500.0	89.77	85.04	9,473.9	5,772.6	280.1	3,229.8	3,241.9	0.00	617,168.79	720,275.63
12,600.0	89.77	85.04	9,474.3	5,773.0	288.8	3,329.4	3,341.9	0.00	617,177.43	720,375.25
12,700.0	89.77	85.04	9,474.6	5,773.3	297.4	3,429.1	3,441.9	0.00	617,186.07	720,474.88
12,800.0	89.77	85.04	9,475.0	5,773.7	306.1	3,528.7	3,541.9	0.00	617,194.71	720,574.50
12,900.0	89.77	85.04	9,475.4	5,774.1	314.7	3,628.3	3,641.9	0.00	617,203.35	720,674.13
13,000.0	89.77	85.04	9,475.8	5,774.5	323.4	3,727.9	3,741.9	0.00	617,212.00	720,773.75
13,100.0	89.77	85.04	9,476.2	5,774.9	332.0	3,827.6	3,841.9	0.00	617,220.64	720,873.38
13,200.0	89.77	85.04	9,476.6	5,775.3	340.6	3,927.2	3,941.9	0.00	617,229.28	720,973.00
13,300.0	89.77	85.04	9,477.0	5,775.7	349.3	4,026.8	4,041.9	0.00	617,237.92	721,072.63
13,400.0	89.77	85.04	9,477.4	5,776.1	357.9	4,126.4	4,141.9	0.00	617,246.56	721,172.25
13,500.0	89.77	85.04	9,477.8	5,776.5	366.6	4,226.1	4,241.9	0.00	617,255.20	721,271.88
13,600.0	89.77	85.04	9,478.2	5,776.9	375.2	4,325.7	4,341.9	0.00	617,263.84	721,371.50
13,700.0	89.77	85.04	9,478.6	5,777.3	383.8	4,425.3	4,441.9	0.00	617,272.48	721,471.13



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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)
13,800.0	89.77	85.04	9,479.0	5,777.7	392.5	4,524.9	4,541.9	0.00	617,281.13	721,570.75
13,900.0	89.77	85.04	9,479.4	5,778.1	401.1	4,624.6	4,641.9	0.00	617,289.77	721,670.38
14,000.0	89.77	85.04	9,479.8	5,778.5	409.8	4,724.2	4,741.9	0.00	617,298.41	721,770.00
14,058.1	89.77	85.04	9,480.0	5,778.7	414.8	4,782.1	4,800.0	0.00	617,303.43	721,827.90

Checked By: _____ Approved By: _____ Date: _____



Project: Lea County, NM (NAD 83)
Site: Warhawk "3" Federal
Well: #1H
Wellbore: OH
Plan: Plan #1 (#1H/OH)



A Schlumberger Company

PROJECT DETAILS: Lea County, NM (NAD 83)
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

WELL DETAILS: #1H

Ground Elevation 3684.3
RKB Elevation KB = 17' @ 3701.3usft (Original Well Elev)
Rig Name: Original Well Elev

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	616888.64	717045.81	32°41'40.449 N	103°45'43.801 W	



Azimuths to Grid North
True North: -0.31°
Magnetic North: 7.35°

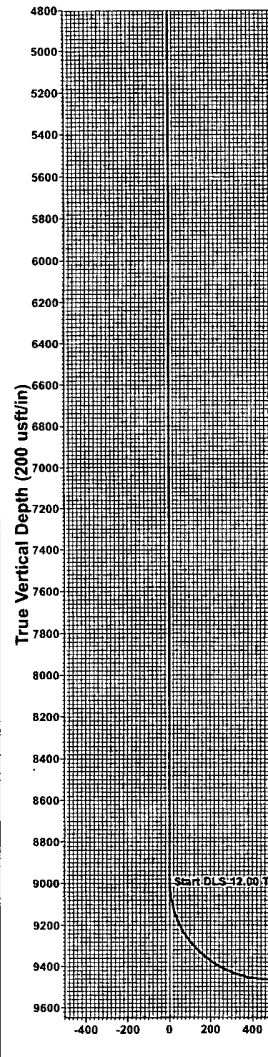
Magnetic Field
Strength: 48840.0snT
Dip Angle: 60.58°
Date: 10/29/2011
Model: IGRF2010

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

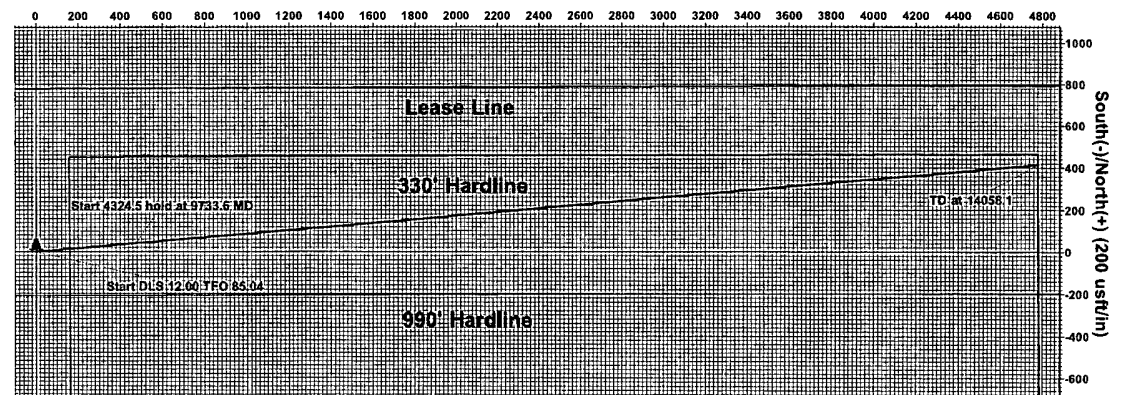
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
BHL (Warhawk 3 Fed #1H)	9480.0	414.8	4782.1	617303.43	721827.90	Point

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	
2.89855	0.00	0.00	8985.5	0.0	0.0	0.00	0.00	0.0	
3.97336	89.77	85.04	9463.0	414.1	473.8	12.00	85.04	475.6	
414058.1	89.77	85.04	9480.0	414.8	4782.1	0.00	0.00	4800.0	BHL (Warhawk 3 Fed #1H)



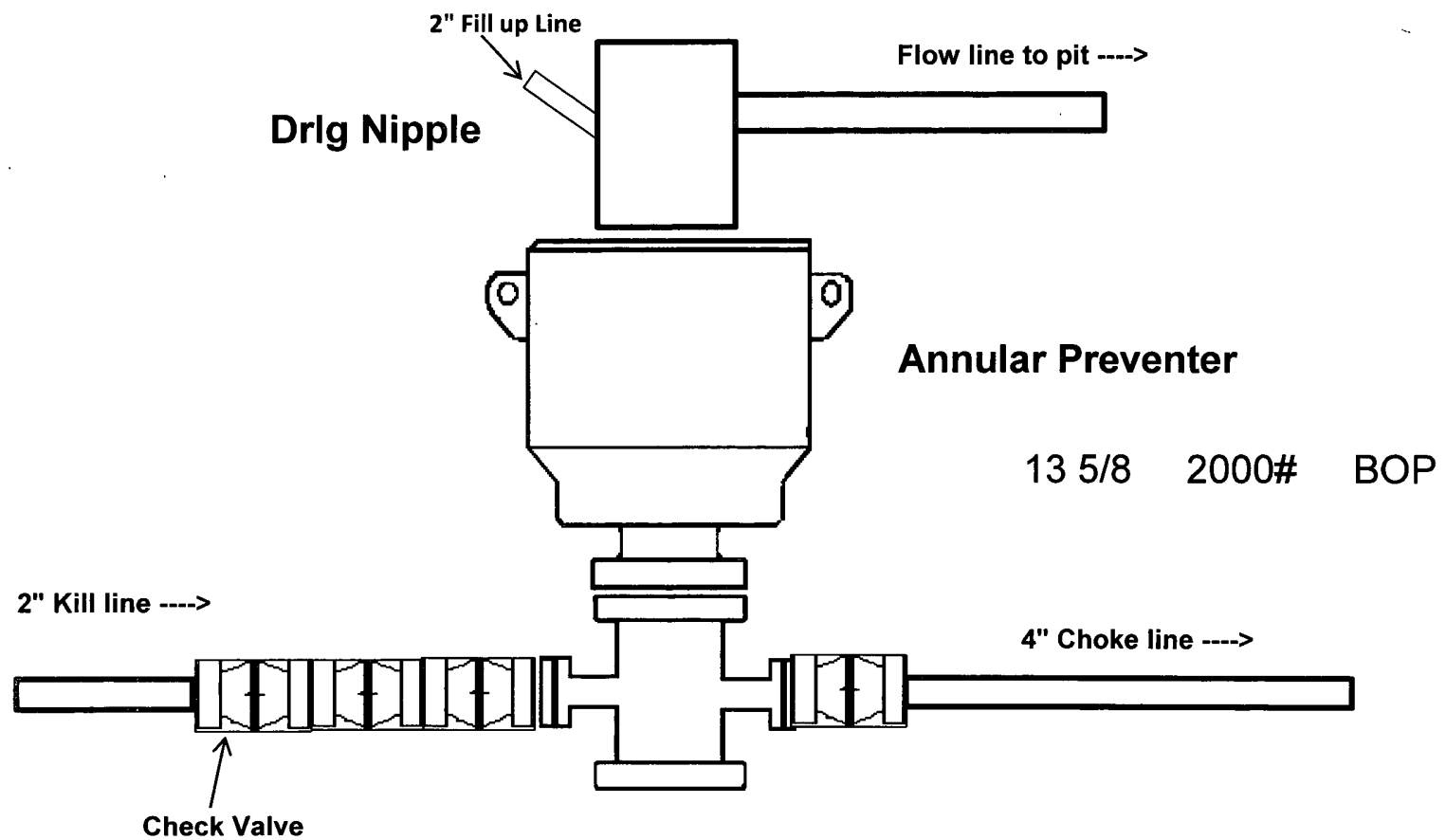
West(-)/East(+) (200 usft/in)



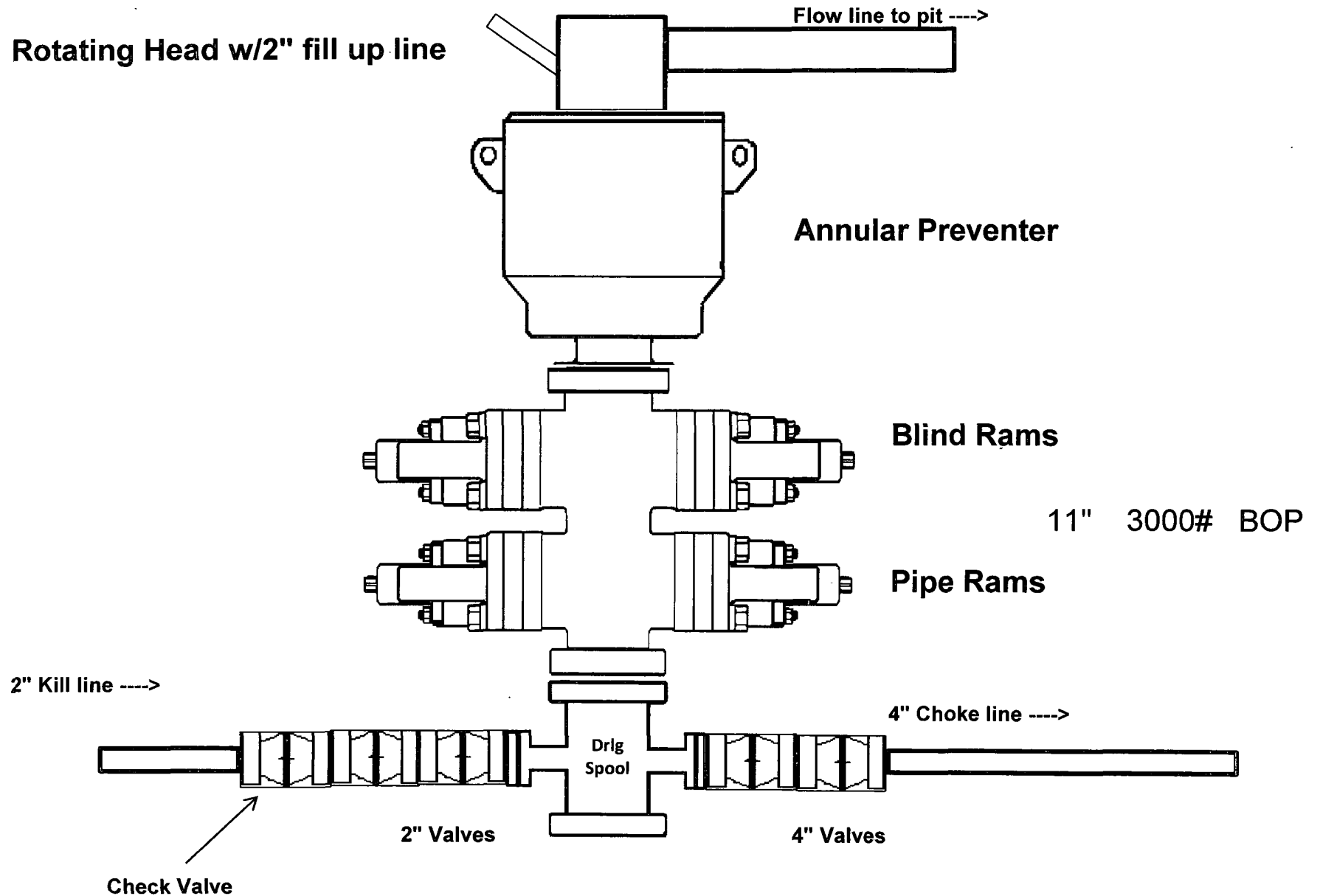
Plan Plan #1 (#1H/OH)

Created By: Michael Trout Date: 15 Oct, October 29 2011
Checked: _____ Date: _____

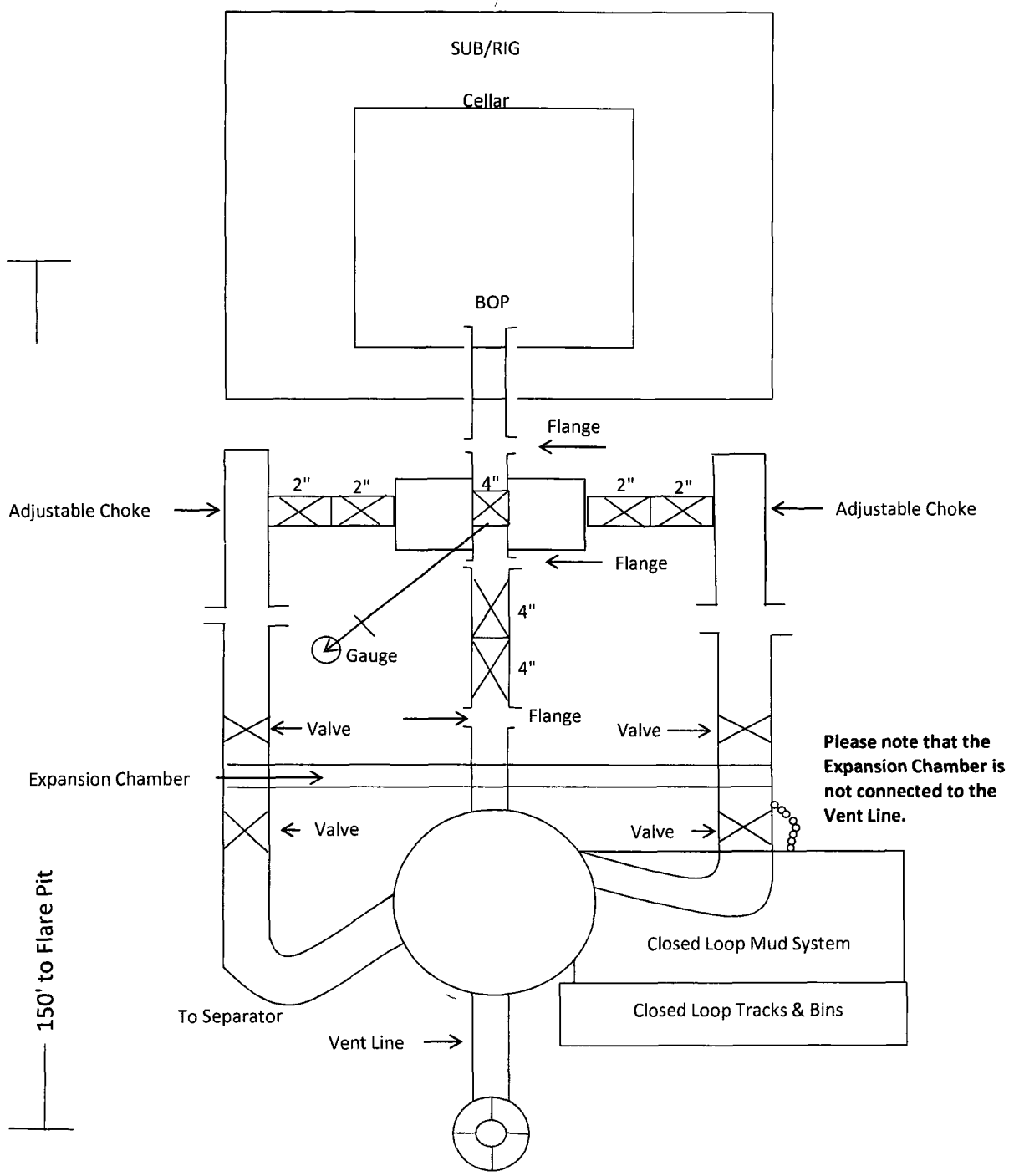
2,000 psi BOP Schematic



3,000 psi BOP Schematic



3M Choke Manifold Equipment



2M Choke Manifold Equipment

