

ATS-11-117

OCD-ARTESIA

Form 3160-3
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

FORM APPROVED
OMB No. 1004-0137
Expires July 31, 2010

5. Lease Serial No.
SHL:NMNM100858 BHL:NMLC69033

6. If Indian, Allottee or Tribe Name
N/A

7. If Unit or CA Agreement, Name and No.
N/A

8. Lease Name and Well No.
Blue Thunder 5 Federal #4H

9. API Well No.
30-015-38477

1a. Type of work: ☒ DRILL ☐ REENTER

1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone

2. Name of Operator COG Operating LLC 229137

3a. Address 2208 W Main Street
Artesia, NM 88210

3b. Phone No. (include area code)
575-784-6940

10. Field and Pool, or Exploratory
Watkins; Bone Spring

4. Location of Well (Report location clearly and in accordance with any State requirements*)

At surface 480' FSL & 500' FEL

At proposed prod. zone 480' FSL & 330' FWL

11. Sec., T. R. M. or Blk. and Survey or Area
Sect 5 T19S R31E

14. Distance in miles and direction from nearest town or post office*
Approx 15 miles to Loco Hills, NM

12. County or Parish
Eddy County

13. State
NM

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any)
480'

16. No. of acres in lease
SHL: 159.58
BHL: 639.22

17. Spacing Unit dedicated to this well
160 acres

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.

19. Proposed Depth
13,235' MD (~8820' TVD)

20. BLM/BIA Bond No. on file
NMB00215

21. Elevations (Show whether DF, KDB, RT, GL, etc.)
3559.2' GL

22. Approximate date work will start*
01/16/2011

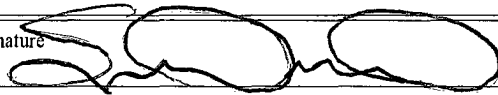
23. Estimated duration
30 days

24. Attachments

RECEIVED
FEB 07 2011
NMOCD ARTESIA

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification
6. Such other site specific information and/or plans as may be required by the BLM.

25. Signature 

Name (Printed/Typed)
Seth Wild

Date
12/02/2010

Title

Drilling Engineer

Approved by (Signature) /s/ Don Peterson

Name (Printed/Typed) /s/ Don Peterson

Date FEB 2 2011

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)

CAPITAN CONTROLLED WATER BASIN

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

APPROVAL SUBJECT TO
GENERAL REQUIREMENTS
AND SPECIAL STIPULATIONS
ATTACHED



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: December 2, 2010

Lease #: NMNM100858 *SHL NMCC 069033 BHL ✓*
Blue Thunder 5 Federal #4H

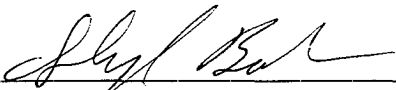
Legal Description: Sec. 5-T19S-R31E
Eddy County, New Mexico

Formation(s): Permian

Bond Coverage: Statewide

BLM Bond File #: NMB000215

COG Operating LLC



Sheryl Baker
Drilling Superintendent

COG Operating LLC
DRILLING AND OPERATIONS PROGRAM

Blue Thunder 5 Federal #4H
Surf: 480' FSL & 500' FEL
BHL: 330' FSL & 480' FWL
Section 5, T19S, R31E
Eddy County, New Mexico

COG Operating LLC

In conjunction with Form 3160-3, Application for Permit to Drill subject well, ~~Marbob Energy Corporation~~ submits the following ten items of pertinent information in accordance with BLM requirements.

1. Geological surface formation: Permian
2. The estimated tops of geologic markers & estimated depths at which anticipated water, oil or gas formations are expected to be encountered are as follows:

Rustler	615'	
Top of Salt	690'	
Btm of Salt	2410'	
Yates	2600'	Oil
Seven Rivers	2960'	
Grayburg	3645'	Oil
San Andreas	4114'	
Delaware	4526'	Oil
Bone Springs	6510'	
1 st BS Sand	7875'	Oil
2 nd BS Sand	8618'	Oil
TD TVD	8820'	
TD MD	13,235'	

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 ~~9 5/8"~~^{13 3/8"} casing at 710' 1000' and circulating cement back to surface. All intervals will be isolated by setting ~~5"~~^{7 7/8"} casing to total depth and circulating cement to surface. *overlapping 9 5/8" by 200'*

3. Proposed Casing Program:

Hole Size	Interval	OD Casing	New or Used	Wt	Collar	Grade	Collapse Design Factor	Burst Design Factor	Tension Design Factor
17 1/2"	0 - 650' 710'	13 3/8"	New	54.5#	LTC <i>STC</i>	H-40 <i>J-55</i>	1.125	1.125	1.6
12 1/4"	650' - 3200'	9 5/8"	New	36#	BUTT	J-55	1.125	1.125	1.6
8 3/4"	3200' - 7000'	7"	New	23#	LTC	N-80	1.125	1.125	1.6
8 3/4"	7000' - 9000'	7"	New	23#	LTC	P-110	1.125	1.125	1.6
7 7/8"	9000' - 13235'	5 1/2"	New	17#	LTC	N-80	1.125	1.125	1.6

5. Proposed Cement Program:

- a. 13 3/8" Surface Cement to surface with 300 sx Class C wt 12.8 yield 1.89
Tail in with 200 sx Class C wt 14.8 yield 1.34
- b. 9 5/8" Intermediate Cement to surface with 700 sx Class C wt 12.7 yield 1.89
Tail in with 250 sx Class C wt 14.8 yield 1.34
- c. 7" & 5 1/2" Production Cement 1st stage with 500 sx "H" acid soluble cement wt 15.0 yield 2.6, cement second stage with 550 sx Class C wt 12.7 yield 1.91 & Tail in with 100 sx Class C wt 14.8 yield 1.33. DV Tool @ 8250'. TOC @ 3000'.

See COA

The above cement volumes could be revised pending the caliper measurement from the open hole logs. The top of cement is designed to reach approximately 200' above the 9 5/8" casing shoe. **All casing is new and API approved.**

6. 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.

7. Estimated BHP: 3660 psi

8. Mud Program: The applicable depths and properties of this system are as follows:

See COA

Depth	Type System	Mud Weight	Viscosity (sec)	Waterloss (cc)
0' - 650' 710'	Fresh Water	8.4	29	N.C.
650' 710' - 3200'	Brine	10.0	29	N.C.
3200' - 13235'	Cut Brine	8.9 - 9.0	29	N.C.

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

9. 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.

10. 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.

11. Potential Hazards:

- a. No abnormal pressures or temperatures are expected. There is no known presence of H₂S in this area. If H₂S is encountered the operator will comply with the provisions of Onshore Oil and Gas Order No. 6. No lost circulation is expected to occur. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. Estimated BHP: 2100 psi. No H₂S is anticipated to be encountered.

12. 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

Eddy County(NAD83)
Blue Thunder 5 Federal
#4H
OH

Plan: Plan #1

Pathfinder X & Y Planning Report

12 November, 2010

PATHFINDER[®]

A Schlumberger Company



Pathfinder

Pathfinder X & Y Planning Report



A Schlumberger Company

Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Blue Thunder 5 Federal
Well: #4H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #4H
WELL @ 3577.20ft (18' KB)
TVD Reference: WELL @ 3577.20ft (18' KB)
M/D Reference: Grid
North Reference: Minimum Curvature
Survey Calculation Method: Midland Database
Database: Midland Database

Project	Eddy County(NAD83)	System Datum:	Mean Sea Level
Map System:	US State Plane 1983		
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Blue Thunder 5 Federal		
Site Position:		Northing: 612,535.970 ft	Latitude: 32° 40' 59.163 N
From:	Map	Easting: 679,570.600 ft	Longitude: 103° 53' 2.551 W
Position Uncertainty:	0.00 ft	Slot Radius:	Grid Convergence: 0.24 °

Well	#4H		
Well Position	+N/-S 0.00 ft	Northing: 612,535.970 ft	Latitude: 32° 40' 59.163 N
	+E/-W 0.00 ft	Easting: 679,570.600 ft	Longitude: 103° 53' 2.551 W
Position Uncertainty	0.00 ft	Wellhead Elevation: ft	Ground Level: 3,559.20 ft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Dip Angle
	IGRF200510	11/12/10	60.59
			Field Strength (nT) 48,950

Design	Plan #1		
Audit Notes:			
Version:			
Vertical Section:	Depth From (TVD) (ft)	Phase: PLAN	Tie On Depth: 0.00
	0.00		
	+N/-S (ft)		Direction (°)
	0.00		269.67
	+E/-W (ft)		
	0.00		

Survey Tool Program	Date	11/12/10	
From (ft)	To (ft)	Survey (Wellbore)	Tool Name
0.00	13,235.57	Plan #1 (OH)	MWD
			Description
			MWD - Standard



Pathfinder
Pathfinder X & Y Planning Report



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Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	D Leg (°/100ft)	Northing (ft)	Easting (ft)
0.00	0.00	0.00	0.00	-3,577.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
100.00	0.00	0.00	100.00	-3,477.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
200.00	0.00	0.00	200.00	-3,377.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
300.00	0.00	0.00	300.00	-3,277.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
400.00	0.00	0.00	400.00	-3,177.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
500.00	0.00	0.00	500.00	-3,077.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
600.00	0.00	0.00	600.00	-2,977.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
700.00	0.00	0.00	700.00	-2,877.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
800.00	0.00	0.00	800.00	-2,777.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
900.00	0.00	0.00	900.00	-2,677.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
1,000.00	0.00	0.00	1,000.00	-2,577.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
1,100.00	0.00	0.00	1,100.00	-2,477.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
1,200.00	0.00	0.00	1,200.00	-2,377.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
1,300.00	0.00	0.00	1,300.00	-2,277.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
1,400.00	0.00	0.00	1,400.00	-2,177.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
1,500.00	0.00	0.00	1,500.00	-2,077.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
1,600.00	0.00	0.00	1,600.00	-1,977.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
1,700.00	0.00	0.00	1,700.00	-1,877.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
1,800.00	0.00	0.00	1,800.00	-1,777.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
1,900.00	0.00	0.00	1,900.00	-1,677.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
2,000.00	0.00	0.00	2,000.00	-1,577.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
2,100.00	0.00	0.00	2,100.00	-1,477.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
2,200.00	0.00	0.00	2,200.00	-1,377.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
2,300.00	0.00	0.00	2,300.00	-1,277.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
2,400.00	0.00	0.00	2,400.00	-1,177.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
2,500.00	0.00	0.00	2,500.00	-1,077.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60
2,600.00	0.00	0.00	2,600.00	-977.20	0.00	0.00	0.00	0.00	612,535.97	679,570.60



Pathfinder
Pathfinder X & Y Planning Report



Company: COG Operating LLC
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Wellbore: OH
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MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	EW (ft)	V. Sec (ft)	DLeg (°/100ft)	Easting (ft)
2,700.00	0.00	0.00	2,700.00	-877.20	0.00	0.00	0.00	0.00	612,535.97
2,800.00	0.00	0.00	2,800.00	-777.20	0.00	0.00	0.00	0.00	612,535.97
2,900.00	0.00	0.00	2,900.00	-677.20	0.00	0.00	0.00	0.00	612,535.97
3,000.00	0.00	0.00	3,000.00	-577.20	0.00	0.00	0.00	0.00	612,535.97
3,100.00	0.00	0.00	3,100.00	-477.20	0.00	0.00	0.00	0.00	612,535.97
3,200.00	0.00	0.00	3,200.00	-377.20	0.00	0.00	0.00	0.00	612,535.97
3,300.00	0.00	0.00	3,300.00	-277.20	0.00	0.00	0.00	0.00	612,535.97
3,400.00	0.00	0.00	3,400.00	-177.20	0.00	0.00	0.00	0.00	612,535.97
3,500.00	0.00	0.00	3,500.00	-77.20	0.00	0.00	0.00	0.00	612,535.97
3,600.00	0.00	0.00	3,600.00	22.80	0.00	0.00	0.00	0.00	612,535.97
3,700.00	0.00	0.00	3,700.00	122.80	0.00	0.00	0.00	0.00	612,535.97
3,800.00	0.00	0.00	3,800.00	222.80	0.00	0.00	0.00	0.00	612,535.97
3,900.00	0.00	0.00	3,900.00	322.80	0.00	0.00	0.00	0.00	612,535.97
4,000.00	0.00	0.00	4,000.00	422.80	0.00	0.00	0.00	0.00	612,535.97
4,100.00	0.00	0.00	4,100.00	522.80	0.00	0.00	0.00	0.00	612,535.97
4,200.00	0.00	0.00	4,200.00	622.80	0.00	0.00	0.00	0.00	612,535.97
4,300.00	0.00	0.00	4,300.00	722.80	0.00	0.00	0.00	0.00	612,535.97
4,400.00	0.00	0.00	4,400.00	822.80	0.00	0.00	0.00	0.00	612,535.97
4,500.00	0.00	0.00	4,500.00	922.80	0.00	0.00	0.00	0.00	612,535.97
4,600.00	0.00	0.00	4,600.00	1,022.80	0.00	0.00	0.00	0.00	612,535.97
4,700.00	0.00	0.00	4,700.00	1,122.80	0.00	0.00	0.00	0.00	612,535.97
4,800.00	0.00	0.00	4,800.00	1,222.80	0.00	0.00	0.00	0.00	612,535.97
4,900.00	0.00	0.00	4,900.00	1,322.80	0.00	0.00	0.00	0.00	612,535.97
5,000.00	0.00	0.00	5,000.00	1,422.80	0.00	0.00	0.00	0.00	612,535.97
5,100.00	0.00	0.00	5,100.00	1,522.80	0.00	0.00	0.00	0.00	612,535.97
5,200.00	0.00	0.00	5,200.00	1,622.80	0.00	0.00	0.00	0.00	612,535.97
5,300.00	0.00	0.00	5,300.00	1,722.80	0.00	0.00	0.00	0.00	612,535.97



Pathfinder
Pathfinder X & Y Planning Report



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MD (ft)	Inc (")	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (%)	EW (ft)	V. Sec (ft)	D Leg (°/100ft)	Northing (ft)	Easting (ft)
5,400.00	0.00	0.00	5,400.00	1,822.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
5,500.00	0.00	0.00	5,500.00	1,922.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
5,600.00	0.00	0.00	5,600.00	2,022.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
5,700.00	0.00	0.00	5,700.00	2,122.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
5,800.00	0.00	0.00	5,800.00	2,222.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
5,900.00	0.00	0.00	5,900.00	2,322.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
6,000.00	0.00	0.00	6,000.00	2,422.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
6,100.00	0.00	0.00	6,100.00	2,522.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
6,200.00	0.00	0.00	6,200.00	2,622.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
6,300.00	0.00	0.00	6,300.00	2,722.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
6,400.00	0.00	0.00	6,400.00	2,822.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
6,500.00	0.00	0.00	6,500.00	2,922.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
6,600.00	0.00	0.00	6,600.00	3,022.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
6,700.00	0.00	0.00	6,700.00	3,122.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
6,800.00	0.00	0.00	6,800.00	3,222.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
6,900.00	0.00	0.00	6,900.00	3,322.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
7,000.00	0.00	0.00	7,000.00	3,422.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
7,100.00	0.00	0.00	7,100.00	3,522.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
7,200.00	0.00	0.00	7,200.00	3,622.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
7,300.00	0.00	0.00	7,300.00	3,722.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
7,400.00	0.00	0.00	7,400.00	3,822.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
7,500.00	0.00	0.00	7,500.00	3,922.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
7,600.00	0.00	0.00	7,600.00	4,022.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
7,700.00	0.00	0.00	7,700.00	4,122.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
7,800.00	0.00	0.00	7,800.00	4,222.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
7,900.00	0.00	0.00	7,900.00	4,322.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
8,000.00	0.00	0.00	8,000.00	4,422.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60



Pathfinder

Pathfinder X & Y Planning Report



Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Blue Thunder 5 Federal
Well: #4H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #4H
TVD Reference: WELL @ 3577.20ft (18' KB)
MD Reference: WELL @ 3577.20ft (18' KB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	EW (ft)	V. Sec (ft)	D Leg (°/100ft)	Northing (ft)	Easting (ft)
8,100.00	0.00	0.00	8,100.00	4,522.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
8,200.00	0.00	0.00	8,200.00	4,622.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
8,300.00	0.00	0.00	8,300.00	4,722.80	0.00	0.00	0.00	0.00	612,535.97	679,570.60
8,342.50	0.00	0.00	8,342.50	4,765.30	0.00	0.00	0.00	0.00	612,535.97	679,570.60
8,350.00	0.90	269.67	8,350.00	4,772.80	0.00	-0.06	0.06	12.00	612,535.97	679,570.54
8,375.00	3.90	269.67	8,374.97	4,797.77	-0.01	-1.11	1.11	12.00	612,535.96	679,569.49
8,400.00	6.90	269.67	8,399.86	4,822.66	-0.02	-3.46	3.46	12.00	612,535.95	679,567.14
8,425.00	9.90	269.67	8,424.59	4,847.39	-0.04	-7.11	7.11	12.00	612,535.93	679,563.49
8,450.00	12.90	269.67	8,449.09	4,871.89	-0.07	-12.05	12.05	12.00	612,535.90	679,558.55
8,475.00	15.90	269.67	8,473.31	4,896.11	-0.11	-18.27	18.27	12.00	612,535.86	679,552.33
8,500.00	18.90	269.67	8,497.16	4,919.96	-0.15	-25.74	25.74	12.00	612,535.82	679,544.86
8,525.00	21.90	269.67	8,520.59	4,943.39	-0.20	-34.45	34.45	12.00	612,535.77	679,536.15
8,550.00	24.90	269.67	8,543.53	4,966.33	-0.26	-44.38	44.38	12.00	612,535.71	679,526.22
8,575.00	27.90	269.67	8,565.92	4,988.72	-0.32	-55.49	55.49	12.00	612,535.65	679,515.11
8,600.00	30.90	269.67	8,587.70	5,010.50	-0.39	-67.76	67.76	12.00	612,535.58	679,502.84
8,625.00	33.90	269.67	8,608.81	5,031.61	-0.47	-81.16	81.16	12.00	612,535.50	679,489.44
8,650.00	36.90	269.67	8,629.18	5,051.98	-0.55	-95.64	95.64	12.00	612,535.42	679,474.96
8,675.00	39.90	269.67	8,648.77	5,071.57	-0.64	-111.16	111.16	12.00	612,535.33	679,459.44
8,700.00	42.90	269.67	8,667.52	5,090.32	-0.74	-127.69	127.69	12.00	612,535.23	679,442.91
8,725.00	45.90	269.67	8,685.39	5,108.19	-0.84	-145.18	145.18	12.00	612,535.13	679,425.42
8,750.00	48.90	269.67	8,702.31	5,125.11	-0.94	-163.58	163.58	12.00	612,535.03	679,407.02
8,775.00	51.90	269.67	8,718.24	5,141.04	-1.05	-182.84	182.84	12.00	612,534.92	679,387.76
8,800.00	54.90	269.67	8,733.15	5,155.95	-1.17	-202.90	202.91	12.00	612,534.80	679,367.70
8,825.00	57.90	269.67	8,746.98	5,169.78	-1.29	-223.72	223.73	12.00	612,534.68	679,346.88
8,850.00	60.90	269.67	8,759.71	5,182.51	-1.41	-245.24	245.24	12.00	612,534.56	679,325.36
8,875.00	63.90	269.67	8,771.29	5,194.09	-1.54	-267.39	267.39	12.00	612,534.43	679,303.21
8,900.00	66.90	269.67	8,781.70	5,204.50	-1.67	-290.12	290.12	12.00	612,534.30	679,280.48



Pathfinder

Pathfinder X & Y Planning Report



Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Blue Thunder 5 Federal
Well: #4H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #4H
TVD Reference: WELL @ 3577.20ft (18' KB)
MD Reference: WELL @ 3577.20ft (18' KB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Planned Survey										
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	D. Leg (°/100ft)	Northing (ft)	Easting (ft)
8,925.00	69.89	269.67	8,790.90	5,213.70	-1.80	-313.36	313.36	12.00	612,534.17	679,257.24
8,950.00	72.89	269.67	8,798.88	5,221.68	-1.94	-337.05	337.05	12.00	612,534.03	679,233.55
8,975.00	75.89	269.67	8,805.60	5,228.40	-2.08	-361.12	361.13	12.00	612,533.89	679,209.48
9,000.00	78.89	269.67	8,811.06	5,233.86	-2.22	-385.52	385.52	12.00	612,533.75	679,185.08
9,025.00	81.89	269.67	8,815.23	5,238.03	-2.36	-410.16	410.17	12.00	612,533.61	679,160.44
9,050.00	84.89	269.67	8,818.10	5,240.90	-2.51	-434.99	435.00	12.00	612,533.46	679,135.61
9,075.00	87.89	269.67	8,819.68	5,242.48	-2.65	-459.94	459.95	12.00	612,533.32	679,110.66
9,092.56	90.00	269.67	8,820.00	5,242.80	-2.75	-477.49	477.50	12.00	612,533.22	679,093.11
9,100.00	90.00	269.67	8,820.00	5,242.80	-2.79	-484.94	484.94	0.00	612,533.18	679,085.66
9,200.00	90.00	269.67	8,820.00	5,242.80	-3.37	-584.94	584.94	0.00	612,532.60	678,985.66
9,300.00	90.00	269.67	8,820.00	5,242.80	-3.94	-684.93	684.94	0.00	612,532.03	678,885.67
9,400.00	90.00	269.67	8,820.00	5,242.80	-4.52	-784.93	784.94	0.00	612,531.45	678,785.67
9,500.00	90.00	269.67	8,820.00	5,242.80	-5.10	-884.93	884.94	0.00	612,530.87	678,685.67
9,600.00	90.00	269.67	8,820.00	5,242.80	-5.67	-984.93	984.94	0.00	612,530.30	678,585.67
9,700.00	90.00	269.67	8,820.00	5,242.80	-6.25	-1,084.93	1,084.94	0.00	612,529.72	678,485.67
9,800.00	90.00	269.67	8,820.00	5,242.80	-6.82	-1,184.93	1,184.94	0.00	612,529.15	678,385.67
9,900.00	90.00	269.67	8,820.00	5,242.80	-7.40	-1,284.92	1,284.94	0.00	612,528.57	678,285.68
10,000.00	90.00	269.67	8,820.00	5,242.80	-7.98	-1,384.92	1,384.94	0.00	612,527.99	678,185.68
10,100.00	90.00	269.67	8,820.00	5,242.80	-8.55	-1,484.92	1,484.94	0.00	612,527.42	678,085.68
10,200.00	90.00	269.67	8,820.00	5,242.80	-9.13	-1,584.92	1,584.94	0.00	612,526.84	677,985.68
10,300.00	90.00	269.67	8,820.00	5,242.80	-9.70	-1,684.92	1,684.94	0.00	612,526.27	677,885.68
10,400.00	90.00	269.67	8,820.00	5,242.80	-10.28	-1,784.92	1,784.94	0.00	612,525.69	677,785.68
10,500.00	90.00	269.67	8,820.00	5,242.80	-10.86	-1,884.91	1,884.94	0.00	612,525.11	677,685.69
10,600.00	90.00	269.67	8,820.00	5,242.80	-11.43	-1,984.91	1,984.94	0.00	612,524.54	677,585.69
10,700.00	90.00	269.67	8,820.00	5,242.80	-12.01	-2,084.91	2,084.94	0.00	612,523.96	677,485.69
10,800.00	90.00	269.67	8,820.00	5,242.80	-12.58	-2,184.91	2,184.94	0.00	612,523.39	677,385.69
10,900.00	90.00	269.67	8,820.00	5,242.80	-13.16	-2,284.91	2,284.94	0.00	612,522.81	677,285.69



Pathfinder Pathfinder X & Y Planning Report



Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Blue Thunder 5 Federal
Well: #4H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well #4H
WELL @ 3577.20ft (18' KB)
WELL @ 3577.20ft (18' KB)
Grid
Minimum Curvature
Midland Database

Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (%)	EW (ft)	V. Sec (ft)	D Leg (°/100ft)	Northing (ft)	Easting (ft)
11,000.00	90.00	269.67	8,820.00	5,242.80	-13.74	-2,384.91	2,384.94	0.00	612,522.23	677,185.69
11,100.00	90.00	269.67	8,820.00	5,242.80	-14.31	-2,484.90	2,484.94	0.00	612,521.66	677,085.70
11,200.00	90.00	269.67	8,820.00	5,242.80	-14.89	-2,584.90	2,584.94	0.00	612,521.08	676,985.70
11,300.00	90.00	269.67	8,820.00	5,242.80	-15.46	-2,684.90	2,684.94	0.00	612,520.51	676,885.70
11,400.00	90.00	269.67	8,820.00	5,242.80	-16.04	-2,784.90	2,784.94	0.00	612,519.93	676,785.70
11,500.00	90.00	269.67	8,820.00	5,242.80	-16.62	-2,884.90	2,884.94	0.00	612,519.35	676,685.70
11,600.00	90.00	269.67	8,820.00	5,242.80	-17.19	-2,984.90	2,984.94	0.00	612,518.78	676,585.70
11,700.00	90.00	269.67	8,820.00	5,242.80	-17.77	-3,084.89	3,084.94	0.00	612,518.20	676,485.71
11,800.00	90.00	269.67	8,820.00	5,242.80	-18.34	-3,184.89	3,184.94	0.00	612,517.63	676,385.71
11,900.00	90.00	269.67	8,820.00	5,242.80	-18.92	-3,284.89	3,284.94	0.00	612,517.05	676,285.71
12,000.00	90.00	269.67	8,820.00	5,242.80	-19.50	-3,384.89	3,384.94	0.00	612,516.47	676,185.71
12,100.00	90.00	269.67	8,820.00	5,242.80	-20.07	-3,484.89	3,484.94	0.00	612,515.90	676,085.71
12,200.00	90.00	269.67	8,820.00	5,242.80	-20.65	-3,584.89	3,584.94	0.00	612,515.32	675,985.71
12,300.00	90.00	269.67	8,820.00	5,242.80	-21.22	-3,684.88	3,684.94	0.00	612,514.75	675,885.72
12,400.00	90.00	269.67	8,820.00	5,242.80	-21.80	-3,784.88	3,784.94	0.00	612,514.17	675,785.72
12,500.00	90.00	269.67	8,820.00	5,242.80	-22.38	-3,884.88	3,884.94	0.00	612,513.59	675,685.72
12,600.00	90.00	269.67	8,820.00	5,242.80	-22.95	-3,934.88	3,984.94	0.00	612,513.02	675,585.72
12,700.00	90.00	269.67	8,820.00	5,242.80	-23.53	-4,084.88	4,084.94	0.00	612,512.44	675,485.72
12,800.00	90.00	269.67	8,820.00	5,242.80	-24.10	-4,184.88	4,184.94	0.00	612,511.87	675,385.72
12,900.00	90.00	269.67	8,820.00	5,242.80	-24.68	-4,284.87	4,284.94	0.00	612,511.29	675,285.73
13,000.00	90.00	269.67	8,820.00	5,242.80	-25.26	-4,384.87	4,384.94	0.00	612,510.71	675,185.73
13,100.00	90.00	269.67	8,820.00	5,242.80	-25.83	-4,484.87	4,484.94	0.00	612,510.14	675,085.73
13,200.00	90.00	269.67	8,820.00	5,242.80	-26.41	-4,584.87	4,584.94	0.00	612,509.56	674,985.73
13,235.57	90.00	269.67	8,820.00	5,242.80	-26.61	-4,620.44	4,620.52	0.00	612,509.36	674,950.16

PBHL(BT#4)



Pathfinder
Pathfinder X & Y Planning Report



Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Blue Thunder 5 Federal
Well: #4H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well #4H
TVD Reference: WELL @ 3577.20ft (18' KB)
MD Reference: WELL @ 3577.20ft (18' KB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Targets					
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)
PBHL(BT#4)	0.00	0.00	8,820.00	-26.52	-4,620.44
- plan hits target center					
- Point					
				612,509.450	674,950.160
				32° 40' 59.091 N	103° 53' 56.614 W

Checked By: _____ Approved By: _____

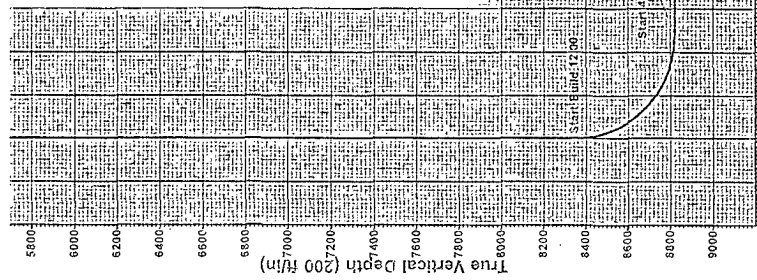
Date: _____



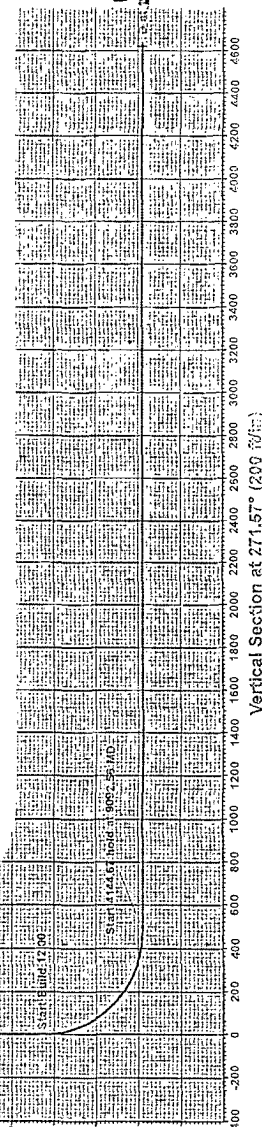
Project: Eddy County(NAD83)
Site: Blue Thunder 5 Federal
Well: #4H
Wellbore: OH
Plan: Plan #1 (#4H/OH)

WELL DETAILS: #4H					
Ground Elevation: 3559.20					
RKB Elevation: WELL @ 3577.20ft (18" KE)					
Rig Name: 18" KB					
Existing					
679570.600 32° 40' 59.163 N 103° 53' 23.51 W					
Northing					
612535.970					
Easting					
679570.600					
Latitude					
32° 40' 59.163 N					
Longitude					
103° 53' 23.51 W					
Slot					
Northing					
612535.970					
Easting					
679570.600					
Latitude					
32° 40' 59.163 N					
Longitude					
103° 53' 23.51 W					

SECTION DETAILS									
Sec	MD	Inc	Azi	TVD	+N/S	+E/W	DLeg	TFace	VSec Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	8342.50	0.00	0.00	8342.50	0.00	0.00	0.00	0.00	0.00
3	9092.56	90.00	271.57	8820.00	13.08	-477.32	12.00	271.57	477.50
4	13333.00	90.00	271.57	8820.00	126.64	-4620.44	0.00	0.00	4622.17



WELLBORE TARGET DETAILS (MAP CO-ORDINATES)				
Name	TVD	+N/S	+E/W	Shape
PBHL(BT#4)	8820.00	126.62	-4620.44	Point



Vertical Section at 271.57° (200 ft/in)

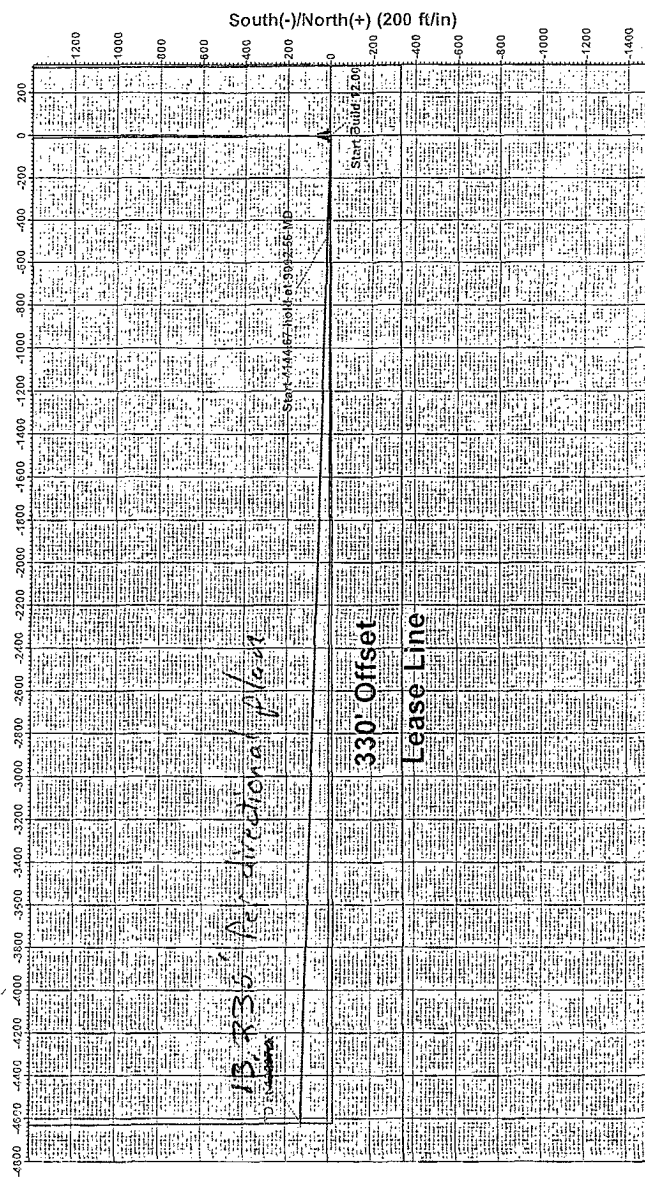


A Schlumberger Company

Azimuths to Grid North
True North: -0.24°
Magnetic North: 7.58°

Magnetic Field
Strength: 43950.2snT
Dip Angle: 60.59°
Date: 11/12/2010
Model: IGRF200510

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



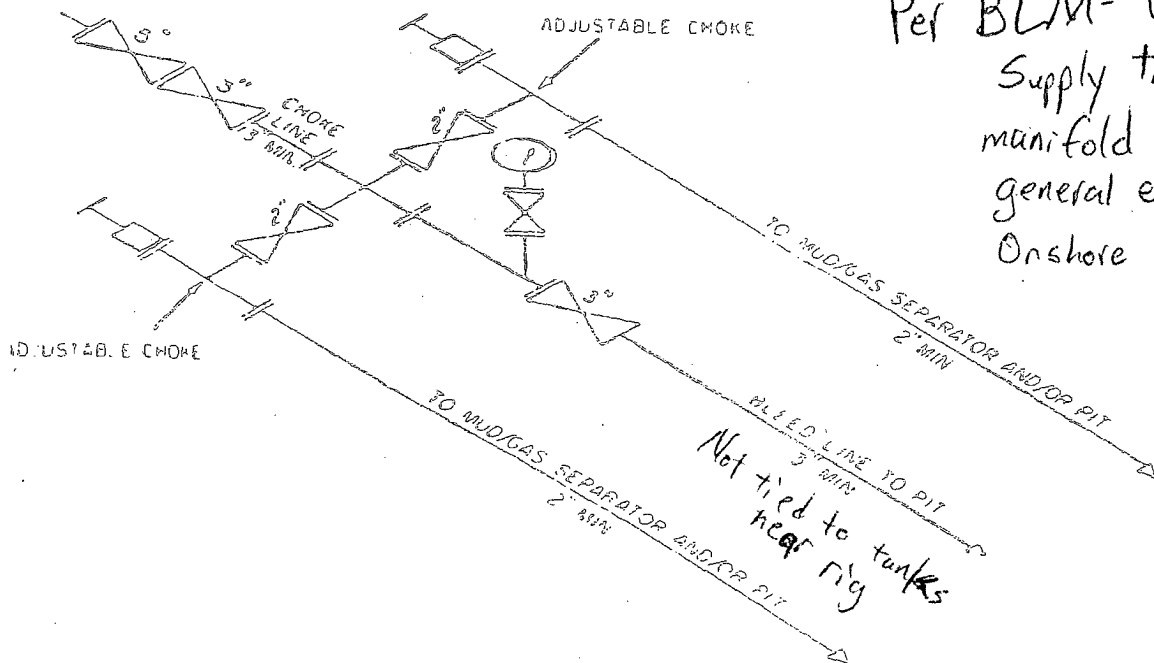
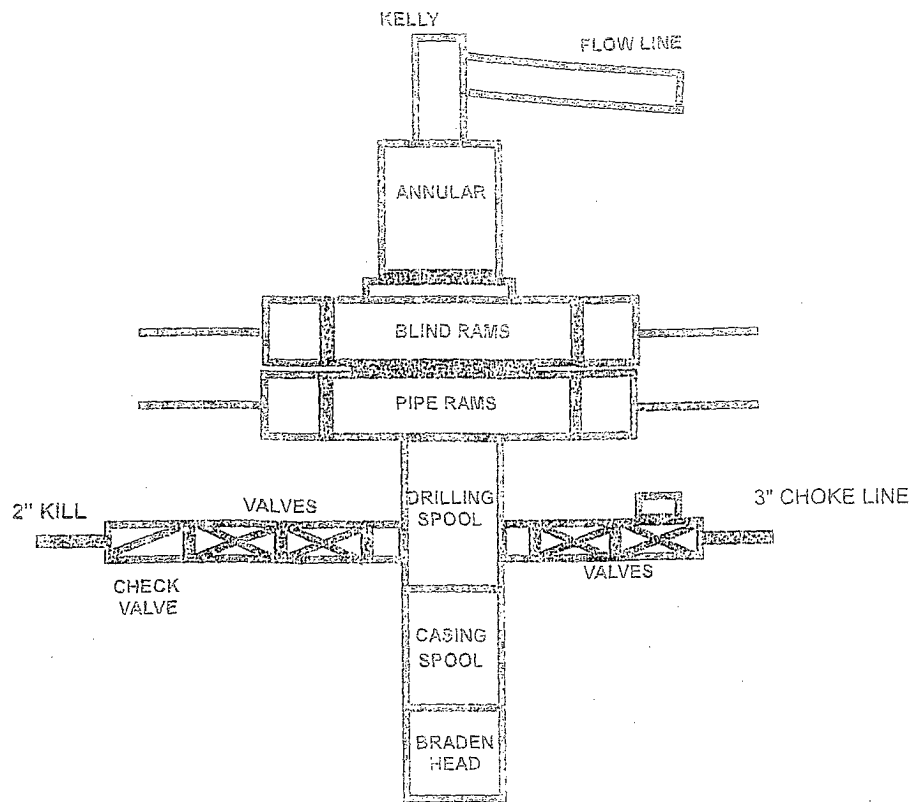
PROJECT DETAILS: Eddy County(NAD83)
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Eastern Zone
System Datum: Mean Sea Level
Local North: Grid

Plan: Plan #1 (#4H/OH)

Created By: Nate Bingham Date: 9:58, November 12 2010

Checked: _____ Date: _____

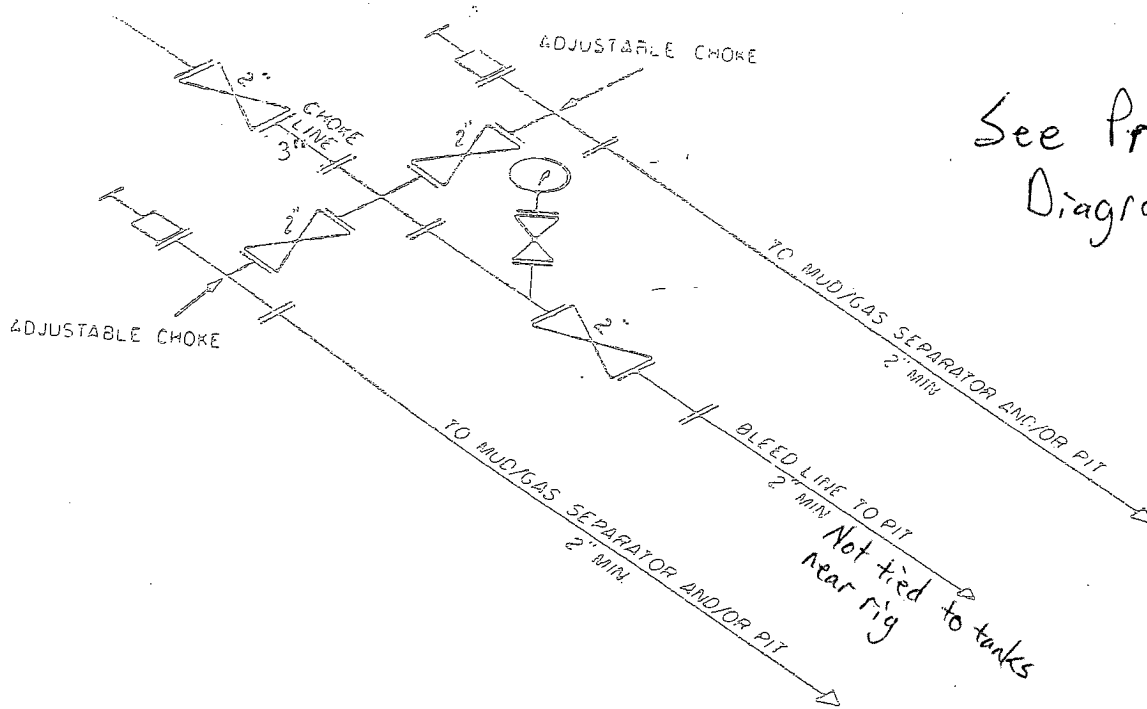
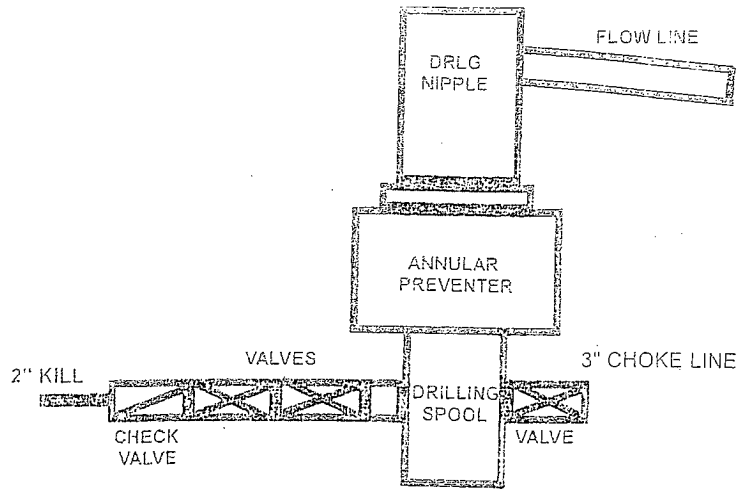
3M SYSTEM



Per BLM- Operator is to supply their own accurate manifold and not the general example from Onshore Order #2.

3M CHOKE MANIFOLD EQUIPMENT — CONFIGURATION OF CHOKES
MAY VARY

2M SYSTEM



2M CHOKE MANIFOLD EQUIPMENT — CONFIGURATION OF CHOKES

MAY VARY

3M Choke Manifold Equipment

