

UNORTHODOX
LOCATION

ATS-13-758

FORM APPROVED
OMB No. 1004-0137
Expires October 31, 2014

Split Estate

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

OCD Hobbs

APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of Work: ☒ DRILL ☐ REENTER		5. Lease Serial No. SHL: Fee, BHL: NMLC063798	
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. <i>(39818)</i> Roy Batty Federal Com #2H	
3b. Phone No. (include area code) 575-748-6940		9. API Well No. 30-025-41332	
4. Location of Well (Report location clearly and in accordance with any State requirements.)* At surface 190' FSL & 1887' FWL Unit Letter N (SESW) SHL Sec 11-T24S-R33E At proposed prod. Zone 330' FNL & 1887' FWL Unit Letter C (NENW) BHL Sec 11-T24S-R33E		10. Field and Pool, or Exploratory Bell Lake; Bone Spring	
14. Distance in miles and direction from nearest town or post office* About 19 miles to Jal		11. Sec., T.R.M. or Blk and Survey or Area Sec. 11-T24S-R33E	
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any) 190'		12. County or Parish Lea County	
16. No. of acres in lease SHL: Fee BHL: 2480		13. State NM	
17. Spacing Unit dedicated to this well 160		18. Distance from location* to nearest well, drilling, completed, SHL: 1234' BHL: 2615' applied for, on this lease, ft. Closest to the wellbore: 93'	
19. Proposed Depth TVD: 11,075' MD: 15,626		20. BLM/BIA Bond No. on file NMB000740 & NMB000215	
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3603.7' GL		22. Approximate date work will start* 8/1/2013	
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 5/28/2013
Title Regulatory Analyst		
Approved by (Signature) <i>/s/George MacDonell</i>	Name (Printed/Typed)	Date AUG - 8 2013
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

Title 18 U.S.C. CONDITION OF APPROVAL: Approval for Drilling ONLY.
States any fact CANNOT produce without the OCD Santa Fe approval for
(Continued on) Non-Standard Location.

APPROVAL FOR TWO YEARS

I hereby agree to make to any department or agency of the United States within its jurisdiction.

*(Instructions on page 2)

Carlsbad Controlled Water Basin

Approval Subject to General Requirements
& Special Stipulations Attached

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

AUG 16 2013

Surface Use Plan
COG Operating, LLC
Roy Batty Federal Com #2H
SL: 190' FSL & 1887' FWL UL N
Section 11, T24S, R33E
BHL: 330' FNL & 1887' FWL UL C
Section Sec 11, T24S, R33E
Lea County, New Mexico

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: May 28, 2013

Lease #: SHL: Fee, BHL: NMLC0063798
Roy Batty Federal Com #2H

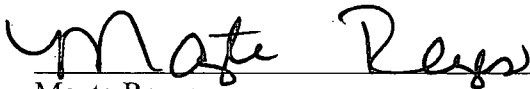
Legal Description: Sec. 11 – T24S – R33E
Lea County, New Mexico

Formation(s): Bone Spring

Bond Coverage: Statewide

BLM Bond File #: NMB000740 & NMB000215

COG OPERATING LLC



Mayte Reyes
Regulatory Analyst

HOEBS OCD
AUG 10 2013
RECEIVED

COG Production LLC
DRILLING AND OPERATIONS PROGRAM

Roy Batty Federal Com 2H

SHL: 190' FSL & 1887' FWL

BHL: 330' FNL & 1887' FWL

Section 11 T24S R33E

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	~ 371'
Rustler	1234'
Top of Salt	1400'
Base of Salt	4935'
Delaware	5190' Oil
Bone Spring	9047' Oil
Wolfcamp	12,204'
TD TVD	11,075'
TD MD	15,626'

HOBBS OCD

AUG 10 2013

RECEIVED

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 1400' 1300' and circulating cement back to surface. All intervals will be isolated by setting 5 1/2" casing to total depth and tying back cement to a minimum of 500' into 9-5/8" csg shoe.

See COA

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' - 1400'	Surface	13 3/8"	New	54#	STC	J-55	1.125	1.125	1.6
12 1/4"	0' - 5200'	Intrmd	9 5/8"	New	40#	LTC	J-55	1.125	1.125	1.6
7 7/8"	0' - 15,626'	Production Curve & Lateral	5 1/2"	New	17#	LTC	P-110	1.125	1.125	1.6

See COA

- 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.

NOBES OGD

AUG 10 2013

RECEIVED

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)

Cmt: 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: 1100 sx 35:65:6 C + Salt + Gilsonite + CFR-3 + HR601
(12.8 ppg / 1.89 cuft/sx)

Tail: 250 sx Class C
(14.8 ppg / 1.35 cuft/sx)

**Calculated w/35% excess on OH volumes

d. 5 1/2" Production

1st Stg: Lead: 500 sx 35:65:6 H + Salt + Gilsonite + CFR-3 + HR601
(12.7 ppg / 1.89 cuft/sx)

Tail: 950 sx 50:50:2 H + Salt + GasStop + HR601 + CFR-3
(14.4 ppg / 1.25 cuft/sx)

2nd Stg: Lead: 625 sx 50:50:10 C + Salt + Gilsonite + CFR-3 + HR601
(11.9 ppg / 2.5 cuft/sx)

Tail: 250 sx Class C
See con (14.8 ppg / 1.34 cuft/sx)

*DVT @ +/- 6700'

**Calculated w/35% excess on OH volumes

- The above cement volumes could be revised pending the caliper measurements.
- The 9-5/8" intermediate cement is designed to circulate cement to surface.
- The production TOC will tie back a minimum 500' into previous shoe

5. Minimum Specifications for Pressure Control:

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

Nipple up on 9 5/8 with 3M system tested 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 minimum 3" choke line will be included in the drilling spool located below the ram-type BOP. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold with 5000 psi WP rating.

6. Estimated BHP & BHT:

Lateral TD = 4840 psi

Lateral TD = 160°F

7. 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' - 1300' ^{1400'}	Fresh Water	8.4	29	N.C.
1300' - 5100' ^{5200'}	Brine	10	29	N.C.
5100' - 15,626' (Lateral)	Cut Brine	8.9 - 9.2	29	N.C.

HO333 COD
AUG 10 2013
RECEIVED

- The necessary mud products for weight addition and fluid loss control will be on location at all times.
- A visual and electronic mud monitoring system will be rigged up prior to spud to detect changes in the volume of mud system. The electronic system consists of a pit volume totalizer, stroke counter and flow sensor at flow line.
- If weight and/or viscosity are introduced to the mud system a daily mud check will be performed by mud contractor, along with tourly check by rig personnel.
- After setting intermediate casing, a third party gas unit detection system will be installed at the flow line.

8. Auxiliary Well Control and Monitoring Equipment:

- See COA*
- 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:

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

10. Potential Hazards:

- See COA*
- 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 soon 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.



HOBBES OGD

AUG 10 2013

RECEIVED

COG Operating LLC

Lea County, NM

Roy Batty Federal Com

#2H

OH

Plan: Design #1

Standard Planning Report

13 May, 2013





Terra Directional Services LLC
Planning Report



Database:	test	Local Co-ordinate Reference:	Well #2H
Company:	COG:Operating,LLC	TVD Reference:	WELL @ 3621.7usft (Original Well Elev)
Project:	Lea County, NM	MD Reference:	WELL @ 3621.7usft (Original Well Elev)
Site:	Roy Batty Federal Com	North Reference:	Grid
Well:	#2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

AUG 1 10 23 13

Project	Lea County, NM		
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		

RECEIVED

RECEIVED

Site Roy Batty Federal Com					
Site Position:		Northing:		446,564.70 usft	
From: Map		Easting:		743,757.70 usft	
Position Uncertainty:		0.0 usft		Slot Radius: 13-3/16 "	
				Latitude: 32° 13' 30.955 N	
				Longitude: 103° 32' 42.296 W	
				Grid Convergence: 0.42 °	

Well	#2H					
Well Position	+N/-S	0.0 usft	Northings:	446,564.70 usft	Latitude:	32° 13' 30.955 N
	+E/-W	0.0 usft	Easting:	743,757.70 usft	Longitude:	103° 32' 42.296 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,603.7 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/13/2013	7.34	60.15	48,428

Design		Design #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	Direction (°) 359.64

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
10,607.5	0.00	0.00	10,607.5	0.0	0.0	0.00	0.00	0.00	0.00	
11,358.6	90.13	359.64	11,085.0	478.6	-3.0	12.00	12.00	0.00	359.64	
15,626.4	90.13	359.64	11,075.3	4,746.2	-29.8	0.00	0.00	0.00	0.00	PBHL(RBFC#2H)



Terra Directional Services LLC
Planning Report



Database: test
Company: COG Operating LLC
Project: Lea County, NM
Site: Roy Batty Federal Com
Well: #2H
Wellbore: OH
Design: Design #1

NOTES
AUG 10 2013

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

Well #2H
WELL @ 3621.7usft (Original Well Elev)
WELL @ 3621.7usft (Original Well Elev)
Grid
Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00



Terra Directional Services LLC
Planning Report



Database:	test	Local Co-ordinate Reference:	Well #2H
Company:	COG Operating LLC	TVD Reference:	WELL @ 3621.7usft (Original Well Elev)
Project:	Lea County, NM	MD Reference:	WELL @ 3621.7usft (Original Well Elev)
Site:	Roy Batty Federal Com	North Reference:	Grid
Well:	#2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

HOBBES
AUG 10 2013
RECEIVED

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00
5,600.0	0.00	0.00	5,600.0	0.0	0.0	0.0	0.00	0.00	0.00
5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00
5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00
5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	0.00
6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	0.00	0.00	0.00
6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00
6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00
6,300.0	0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00
6,500.0	0.00	0.00	6,500.0	0.0	0.0	0.0	0.00	0.00	0.00
6,600.0	0.00	0.00	6,600.0	0.0	0.0	0.0	0.00	0.00	0.00
6,700.0	0.00	0.00	6,700.0	0.0	0.0	0.0	0.00	0.00	0.00
6,800.0	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00
6,900.0	0.00	0.00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00
7,000.0	0.00	0.00	7,000.0	0.0	0.0	0.0	0.00	0.00	0.00
7,100.0	0.00	0.00	7,100.0	0.0	0.0	0.0	0.00	0.00	0.00
7,200.0	0.00	0.00	7,200.0	0.0	0.0	0.0	0.00	0.00	0.00
7,300.0	0.00	0.00	7,300.0	0.0	0.0	0.0	0.00	0.00	0.00
7,400.0	0.00	0.00	7,400.0	0.0	0.0	0.0	0.00	0.00	0.00
7,500.0	0.00	0.00	7,500.0	0.0	0.0	0.0	0.00	0.00	0.00
7,600.0	0.00	0.00	7,600.0	0.0	0.0	0.0	0.00	0.00	0.00
7,700.0	0.00	0.00	7,700.0	0.0	0.0	0.0	0.00	0.00	0.00
7,800.0	0.00	0.00	7,800.0	0.0	0.0	0.0	0.00	0.00	0.00
7,900.0	0.00	0.00	7,900.0	0.0	0.0	0.0	0.00	0.00	0.00
8,000.0	0.00	0.00	8,000.0	0.0	0.0	0.0	0.00	0.00	0.00
8,100.0	0.00	0.00	8,100.0	0.0	0.0	0.0	0.00	0.00	0.00
8,200.0	0.00	0.00	8,200.0	0.0	0.0	0.0	0.00	0.00	0.00
8,300.0	0.00	0.00	8,300.0	0.0	0.0	0.0	0.00	0.00	0.00
8,400.0	0.00	0.00	8,400.0	0.0	0.0	0.0	0.00	0.00	0.00
8,500.0	0.00	0.00	8,500.0	0.0	0.0	0.0	0.00	0.00	0.00
8,600.0	0.00	0.00	8,600.0	0.0	0.0	0.0	0.00	0.00	0.00
8,700.0	0.00	0.00	8,700.0	0.0	0.0	0.0	0.00	0.00	0.00
8,800.0	0.00	0.00	8,800.0	0.0	0.0	0.0	0.00	0.00	0.00
8,900.0	0.00	0.00	8,900.0	0.0	0.0	0.0	0.00	0.00	0.00
9,000.0	0.00	0.00	9,000.0	0.0	0.0	0.0	0.00	0.00	0.00
9,100.0	0.00	0.00	9,100.0	0.0	0.0	0.0	0.00	0.00	0.00
9,200.0	0.00	0.00	9,200.0	0.0	0.0	0.0	0.00	0.00	0.00
9,300.0	0.00	0.00	9,300.0	0.0	0.0	0.0	0.00	0.00	0.00
9,400.0	0.00	0.00	9,400.0	0.0	0.0	0.0	0.00	0.00	0.00
9,500.0	0.00	0.00	9,500.0	0.0	0.0	0.0	0.00	0.00	0.00
9,600.0	0.00	0.00	9,600.0	0.0	0.0	0.0	0.00	0.00	0.00
9,700.0	0.00	0.00	9,700.0	0.0	0.0	0.0	0.00	0.00	0.00
9,800.0	0.00	0.00	9,800.0	0.0	0.0	0.0	0.00	0.00	0.00
9,900.0	0.00	0.00	9,900.0	0.0	0.0	0.0	0.00	0.00	0.00
10,000.0	0.00	0.00	10,000.0	0.0	0.0	0.0	0.00	0.00	0.00
10,100.0	0.00	0.00	10,100.0	0.0	0.0	0.0	0.00	0.00	0.00
10,200.0	0.00	0.00	10,200.0	0.0	0.0	0.0	0.00	0.00	0.00
10,300.0	0.00	0.00	10,300.0	0.0	0.0	0.0	0.00	0.00	0.00
10,400.0	0.00	0.00	10,400.0	0.0	0.0	0.0	0.00	0.00	0.00
10,500.0	0.00	0.00	10,500.0	0.0	0.0	0.0	0.00	0.00	0.00
10,607.5	0.00	0.00	10,607.5	0.0	0.0	0.0	0.00	0.00	0.00



Terra Directional Services LLC
Planning Report



Database:	test	Local Co-ordinate Reference:	Well #2H
Company:	COG Operating LLC	TVD Reference:	WELL @ 3621.7usft (Original Well Elev)
Project:	Lea County, NM	MD Reference:	WELL @ 3621.7usft (Original Well Elev)
Site:	Roy Batty Federal Com	North Reference:	Grid
Well:	#2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

10653 OOD
AUG 10 2013

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
KOP @ 10607.5' MD									
10,625.0	2.10	359.64	10,625.0	0.3	0.0	0.3	12.00	12.00	0.00
10,650.0	5.10	359.64	10,649.9	1.9	0.0	1.9	12.00	12.00	0.00
10,675.0	8.10	359.64	10,674.8	4.8	0.0	4.8	12.00	12.00	0.00
10,700.0	11.10	359.64	10,699.4	8.9	-0.1	8.9	12.00	12.00	0.00
10,725.0	14.10	359.64	10,723.8	14.4	-0.1	14.4	12.00	12.00	0.00
10,750.0	17.10	359.64	10,747.9	21.1	-0.1	21.1	12.00	12.00	0.00
10,775.0	20.10	359.64	10,771.6	29.1	-0.2	29.1	12.00	12.00	0.00
10,800.0	23.10	359.64	10,794.8	38.3	-0.2	38.3	12.00	12.00	0.00
10,825.0	26.10	359.64	10,817.6	48.7	-0.3	48.7	12.00	12.00	0.00
10,850.0	29.10	359.64	10,839.7	60.3	-0.4	60.3	12.00	12.00	0.00
10,875.0	32.10	359.64	10,861.2	73.0	-0.5	73.0	12.00	12.00	0.00
10,900.0	35.10	359.64	10,882.0	86.8	-0.5	86.8	12.00	12.00	0.00
10,925.0	38.10	359.64	10,902.1	101.7	-0.6	101.7	12.00	12.00	0.00
10,950.0	41.10	359.64	10,921.4	117.7	-0.7	117.7	12.00	12.00	0.00
10,975.0	44.10	359.64	10,939.8	134.6	-0.8	134.6	12.00	12.00	0.00
11,000.0	47.10	359.64	10,957.3	152.4	-1.0	152.4	12.00	12.00	0.00
11,025.0	50.10	359.64	10,973.8	171.2	-1.1	171.2	12.00	12.00	0.00
11,050.0	53.10	359.64	10,989.3	190.8	-1.2	190.8	12.00	12.00	0.00
11,075.0	56.10	359.64	11,003.8	211.1	-1.3	211.1	12.00	12.00	0.00
11,100.0	59.10	359.64	11,017.2	232.2	-1.5	232.3	12.00	12.00	0.00
11,125.0	62.10	359.64	11,029.5	254.0	-1.6	254.0	12.00	12.00	0.00
11,150.0	65.10	359.64	11,040.6	276.4	-1.7	276.4	12.00	12.00	0.00
11,175.0	68.09	359.64	11,050.5	299.4	-1.9	299.4	12.00	12.00	0.00
11,200.0	71.09	359.64	11,059.2	322.8	-2.0	322.8	12.00	12.00	0.00
11,225.0	74.09	359.64	11,066.7	346.6	-2.2	346.6	12.00	12.00	0.00
11,250.0	77.09	359.64	11,072.9	370.8	-2.3	370.9	12.00	12.00	0.00
11,275.0	80.09	359.64	11,077.9	395.3	-2.5	395.4	12.00	12.00	0.00
11,300.0	83.09	359.64	11,081.5	420.1	-2.6	420.1	12.00	12.00	0.00
11,325.0	86.09	359.64	11,083.9	445.0	-2.8	445.0	12.00	12.00	0.00
11,350.0	89.09	359.64	11,084.9	469.9	-3.0	469.9	12.00	12.00	0.00
11,358.6	90.13	359.64	11,085.0	478.6	-3.0	478.6	12.00	12.00	0.00
EOC @ 11358.6' MD, 90.13° INC, 359.64° AZI									
11,400.0	90.13	359.64	11,084.9	519.9	-3.3	519.9	0.00	0.00	0.00
11,500.0	90.13	359.64	11,084.7	619.9	-3.9	619.9	0.00	0.00	0.00
11,600.0	90.13	359.64	11,084.5	719.9	-4.5	719.9	0.00	0.00	0.00
11,700.0	90.13	359.64	11,084.2	819.9	-5.2	819.9	0.00	0.00	0.00
11,800.0	90.13	359.64	11,084.0	919.9	-5.8	919.9	0.00	0.00	0.00
11,900.0	90.13	359.64	11,083.8	1,019.9	-6.4	1,019.9	0.00	0.00	0.00
12,000.0	90.13	359.64	11,083.5	1,119.9	-7.0	1,119.9	0.00	0.00	0.00
12,100.0	90.13	359.64	11,083.3	1,219.9	-7.7	1,219.9	0.00	0.00	0.00
12,200.0	90.13	359.64	11,083.1	1,319.9	-8.3	1,319.9	0.00	0.00	0.00
12,300.0	90.13	359.64	11,082.9	1,419.9	-8.9	1,419.9	0.00	0.00	0.00
12,400.0	90.13	359.64	11,082.6	1,519.9	-9.6	1,519.9	0.00	0.00	0.00
12,500.0	90.13	359.64	11,082.4	1,619.9	-10.2	1,619.9	0.00	0.00	0.00
12,600.0	90.13	359.64	11,082.2	1,719.9	-10.8	1,719.9	0.00	0.00	0.00
12,700.0	90.13	359.64	11,082.0	1,819.9	-11.4	1,819.9	0.00	0.00	0.00
12,800.0	90.13	359.64	11,081.7	1,919.9	-12.1	1,919.9	0.00	0.00	0.00
12,900.0	90.13	359.64	11,081.5	2,019.9	-12.7	2,019.9	0.00	0.00	0.00
13,000.0	90.13	359.64	11,081.3	2,119.9	-13.3	2,119.9	0.00	0.00	0.00
13,100.0	90.13	359.64	11,081.0	2,219.9	-13.9	2,219.9	0.00	0.00	0.00
13,200.0	90.13	359.64	11,080.8	2,319.9	-14.6	2,319.9	0.00	0.00	0.00
13,300.0	90.13	359.64	11,080.6	2,419.9	-15.2	2,419.9	0.00	0.00	0.00
13,400.0	90.13	359.64	11,080.4	2,519.9	-15.8	2,519.9	0.00	0.00	0.00



Terra Directional Services LLC
Planning Report



Database:	test	Local Co-ordinate Reference:	Well #2H
Company:	COG Operating LLC	TVD Reference:	WELL @ 3621.7usft (Original Well Elev) CD
Project:	Lea County, NM	MD Reference:	WELL @ 3621.7usft (Original Well Elev)
Site:	Roy Batty Federal Com	North Reference:	Grid
Well:	#2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

AUG 10 2013

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,500.0	90.13	359.64	11,080.1	2,619.9	-16.5	2,619.9	0.00	0.00	0.00
13,600.0	90.13	359.64	11,079.9	2,719.9	-17.1	2,719.9	0.00	0.00	0.00
13,700.0	90.13	359.64	11,079.7	2,819.9	-17.7	2,819.9	0.00	0.00	0.00
13,800.0	90.13	359.64	11,079.5	2,919.9	-18.3	2,919.9	0.00	0.00	0.00
13,900.0	90.13	359.64	11,079.2	3,019.9	-19.0	3,019.9	0.00	0.00	0.00
14,000.0	90.13	359.64	11,079.0	3,119.9	-19.6	3,119.9	0.00	0.00	0.00
14,100.0	90.13	359.64	11,078.8	3,219.9	-20.2	3,219.9	0.00	0.00	0.00
14,200.0	90.13	359.64	11,078.6	3,319.9	-20.9	3,319.9	0.00	0.00	0.00
14,300.0	90.13	359.64	11,078.3	3,419.9	-21.5	3,419.9	0.00	0.00	0.00
14,400.0	90.13	359.64	11,078.1	3,519.9	-22.1	3,519.9	0.00	0.00	0.00
14,500.0	90.13	359.64	11,077.9	3,619.9	-22.7	3,619.9	0.00	0.00	0.00
14,600.0	90.13	359.64	11,077.6	3,719.9	-23.4	3,719.9	0.00	0.00	0.00
14,700.0	90.13	359.64	11,077.4	3,819.9	-24.0	3,819.9	0.00	0.00	0.00
14,800.0	90.13	359.64	11,077.2	3,919.9	-24.6	3,919.9	0.00	0.00	0.00
14,900.0	90.13	359.64	11,077.0	4,019.9	-25.3	4,019.9	0.00	0.00	0.00
15,000.0	90.13	359.64	11,076.7	4,119.9	-25.9	4,119.9	0.00	0.00	0.00
15,100.0	90.13	359.64	11,076.5	4,219.9	-26.5	4,219.9	0.00	0.00	0.00
15,200.0	90.13	359.64	11,076.3	4,319.8	-27.1	4,319.9	0.00	0.00	0.00
15,300.0	90.13	359.64	11,076.1	4,419.8	-27.8	4,419.9	0.00	0.00	0.00
15,400.0	90.13	359.64	11,075.8	4,519.8	-28.4	4,519.9	0.00	0.00	0.00
15,500.0	90.13	359.64	11,075.6	4,619.8	-29.0	4,619.9	0.00	0.00	0.00
15,600.0	90.13	359.64	11,075.4	4,719.8	-29.7	4,719.9	0.00	0.00	0.00
15,626.4	90.13	359.64	11,075.3	4,746.2	-29.8	4,746.3	0.00	0.00	0.00

TD at 15626.4 -PBHL(RBFC#2H)

Design Targets

Target Name

- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- Shape									
PBHL(RBFC#2H)	0.00	0.01	11,075.0	4,746.2	-29.4	451,310.90	743,728.30	32° 14' 17.923 N	103° 32' 42.233 W
- plan misses target center by 0.5usft at 15626.4usft MD (11075.3 TVD, 4746.2 N, -29.8 E)									
- Point									

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,607.5	10,607.5	0.0	0.0	KOP @ 10607.5' MD
11,358.6	11,085.0	478.6	-3.0	EOC @ 11358.6' MD, 90.13° INC, 359.64° AZI
15,626.4	11,075.3	4,746.2	-29.8	TD at 15626.4



Section Details										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	10607.5	0.00	0.00	10607.5	0.0	0.0	0.00	0.00	0.0	
3	11358.6	90.13	359.64	11085.0	478.6	-3.0	12.00	359.64	478.6	
4	15626.4	90.13	359.64	11075.3	4746.2	-29.8	0.00	0.00	4746.3	PBHL(RBFC#2H)

COG Operating LLC
Project: Lea County, NM
Site: Roy Batty Federal Com
Well: #2H
Wellbore: OH
Plan: Design #1 (#2H/OH)

WELL DETAILS: #2H

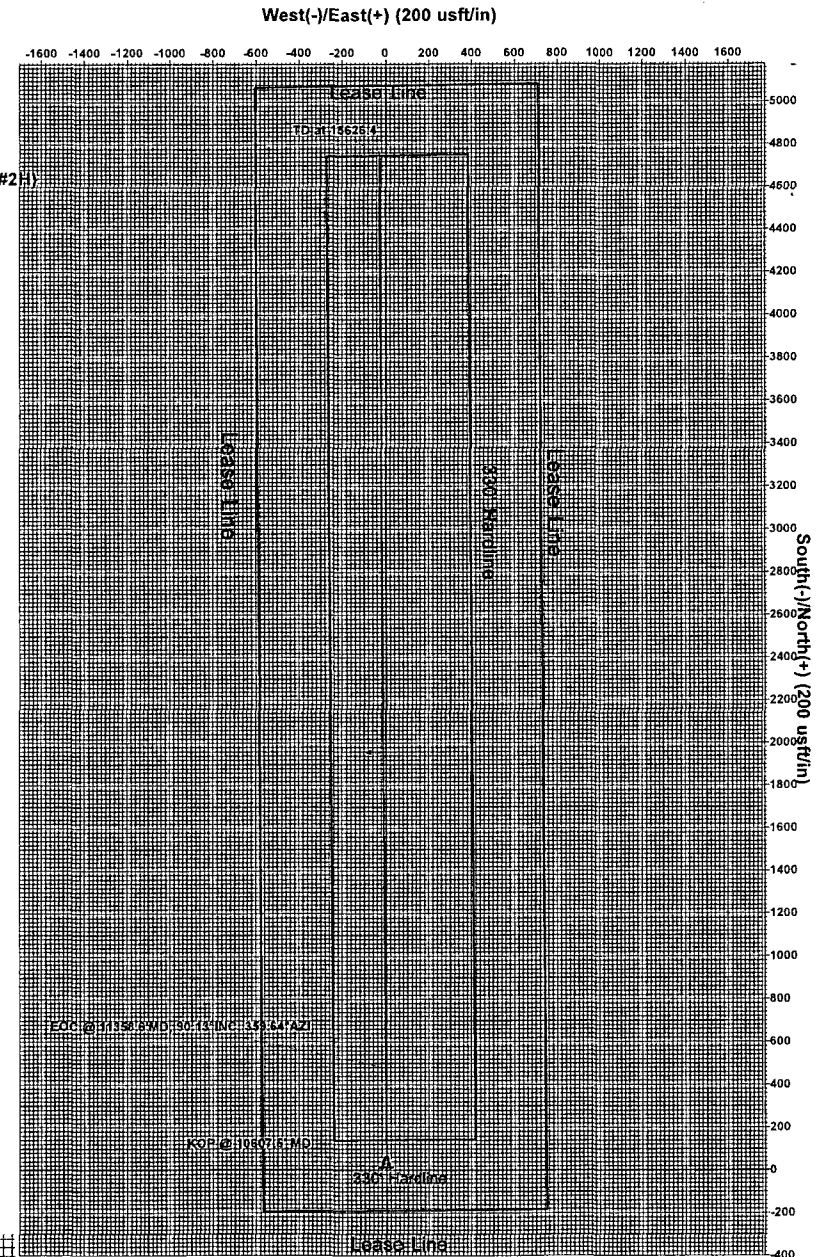
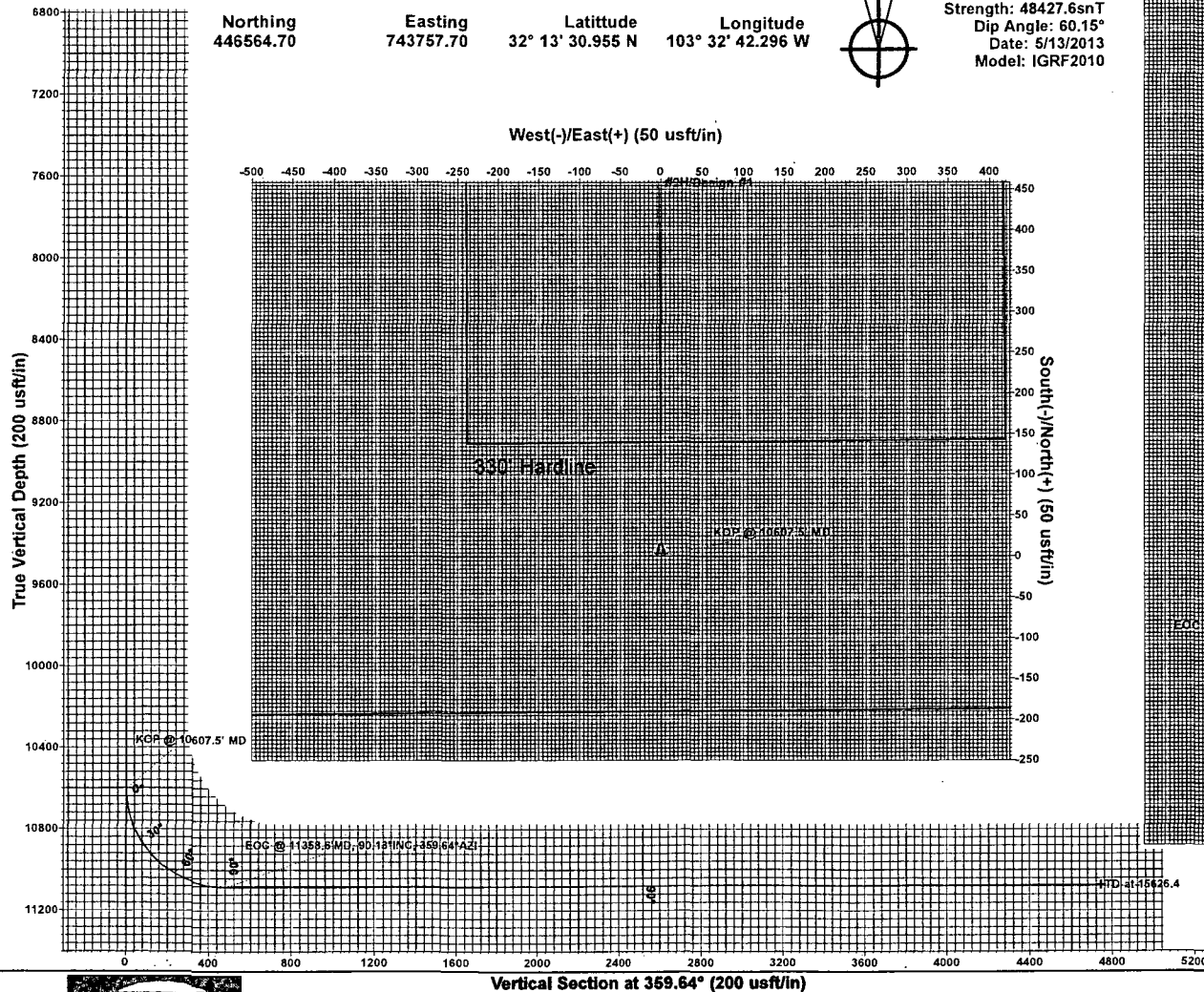
Ground Elevation:: 3603.7
RKB Elevation: WELL @ 3621.7usft (Original Well Elev)
Rig Name: Original Well Elev

Northing 446564.70
Easting 743757.70
Latitude 32° 13' 30.955 N
Longitude 103° 32' 42.296 W



Azimuths to Grid North
True North: -0.42°
Magnetic North: 6.92°

Magnetic Field
Strength: 48427.6snT
Dip Angle: 60.15°
Date: 5/13/2013
Model: IGRF2010



HO255 OCD

AUG 10 2013

RECEIVED

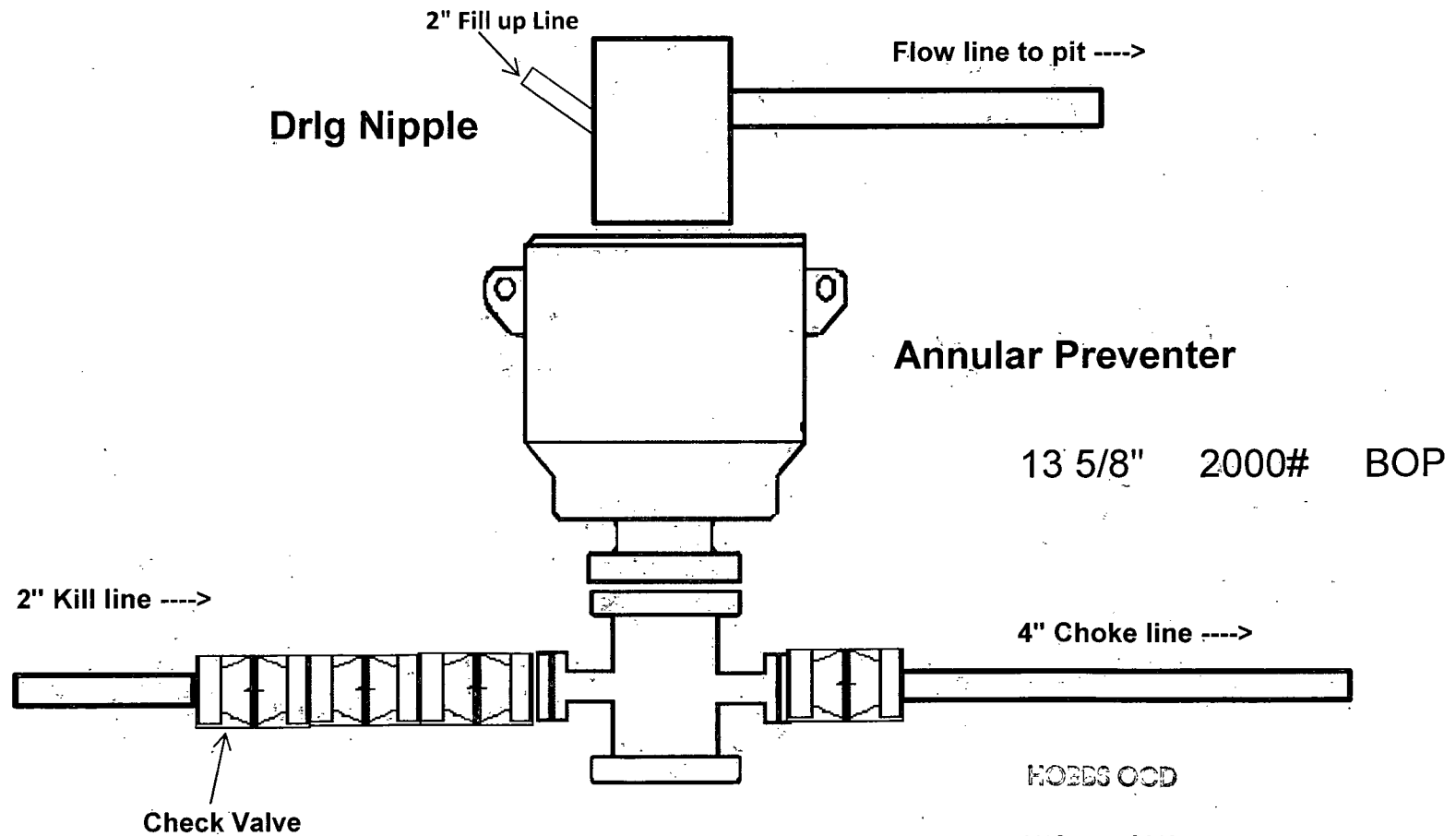
PROJECT DETAILS: Lea County, NM
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid

Plan: Design #1 (#2H/OH)
Created By: Well Planner Date: 14:37, May 13 2013



Terra Directional Services
322 Spring Hill Drive, Suite A100. Spring, Texas 77386
432.425.7532

2,000 psi BOP Schematic

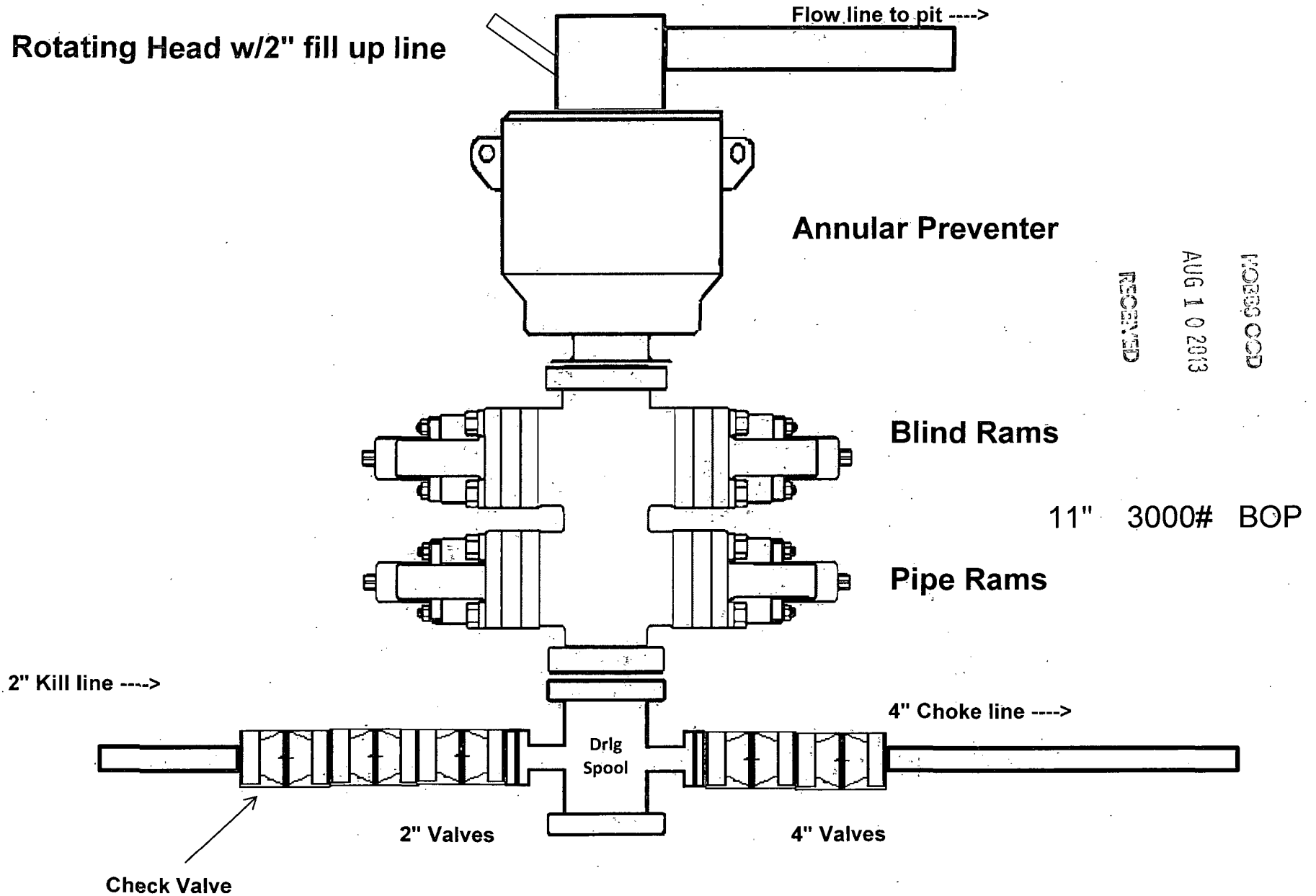


MOBBS OOD

AUG 10 2013

RECEIVED

3,000 psi BOP Schematic



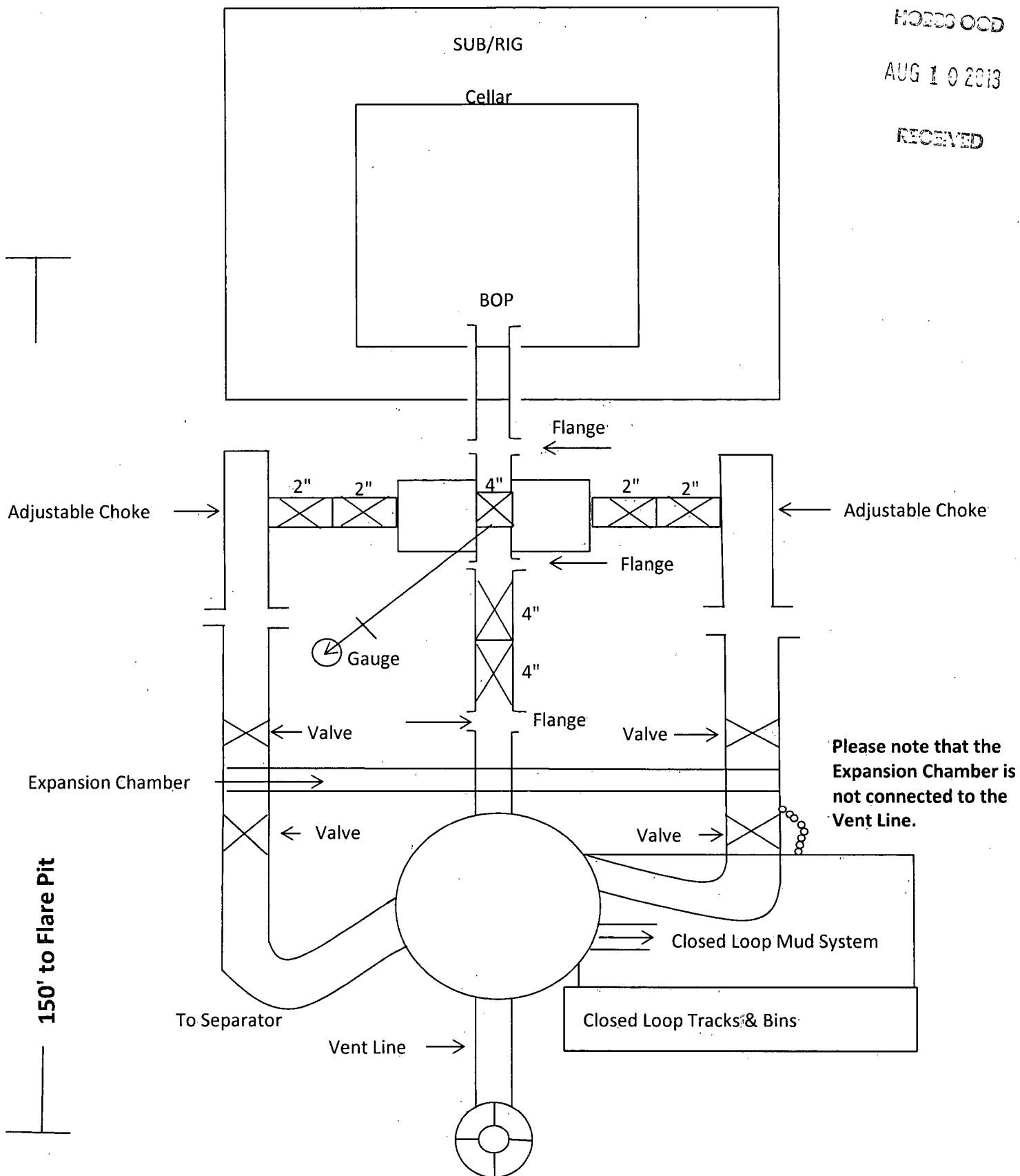
HOESS OGD
AUG 10 2013
RECEIVED

2M Choke Manifold Equipment

WOBBO OOD

AUG 10 2013

RECEIVED



3M Choke Manifold Equipment

HOEDC OCD

AUG 10 2013

RECEIVED

