

Split Estate

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

OCD Hobbs
UNORTHODOX
LOCATION

APPLICATION FOR PERMIT TO DRILL OR REENTER LOCATION

1a. Type of Work: ☒ DRILL ☐ REENTER		5. Lease Serial No.	
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		SHL: Fee, BHL: NMLC063798	
2. Name of Operator COG Operating LLC.		6. If Indian, Allottee or Tribe Name	
3a. Address 2208 West Main Street Artesia, NM 88210		7. If Unit or CA Agreement, Name and No.	
3b. Phone No. (include area code) 575-748-6940		8. Lease Name and Well No. (39818) Roy Batty Federal Com #3H	
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 190' FSL & 1887' FEL Unit Letter O (SWSE) SHL Sec 11-T24S-R33E At proposed prod. Zone 330' FNL & 1887' FEL Unit Letter B (NWNE) BHL Sec 11-T24S-R33E		9. API Well No. (30-025-41333)	
14. Distance in miles and direction from nearest town or post office* About 19 miles to Jal		10. Field and Pool, or Exploratory (5130) Bell Lake; Bone Spring	
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any) 190'		11. Sec. T.R.M. or Blk and Survey or Area Sec. 11- T24S - R33E	
16. No. of acres in lease SHL: Fee BHL: 2480		12. County or Parish Lea County	
17. Spacing Unit dedicated to this well 160		13. State NM	
18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. SHL: 2280' BHL: 3288'		20. BLM/BIA Bond No. on file NMB000740 & NMB000215	
19. Proposed Depth TVD: 11,040' MD: 15,600'		21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3607.6' 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
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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 legan or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon

Conditions of approval, i

Title 18 U.S.C. Section 1C
States any false, fictitious

(Continued on page 2)

CONDITION OF APPROVAL: Approval for Drilling ONLY.
CANNOT produce without the OCD Santa Fe approval for Non-Standard Location.

APPROVAL FOR TWO YEARS

and willfully to make to any department or agency of the United
fiction.

*(Instructions on page 2)

Carlsbad Controlled Water Basin

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

AUG 16 2013

Approval Subject to General Requirements
& Special Stipulations Attached

Surface Use Plan
COG Operating, LLC
Roy Batty Federal Com #3H
SL: 190' FSL & 1887' FEL UL O
Section 11, T24S, R33E
BHL: 330' FNL & 1887' FEL UL B
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 #3H

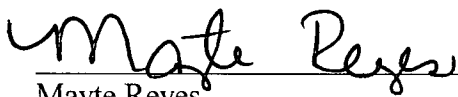
Legal Description: Sec. 11 – T24S – R33E
Lea County, New Mexico

Formation(s): Bone Spring

Bond Coverage: Statewide

BLM Bond File #: NMB000740 & NMB000215

COG OPERATING LLC



Mayte Reyes
Regulatory Analyst

HOZES OCD

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COG Production LLC
DRILLING AND OPERATIONS PROGRAM
Roy Batty Federal Com 3H
SHL: 190' FSL & 1887' FEL
BHL: 330' FNL & 1887' FEL
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	1219'	
Top of Salt	1385'	HOBBES OCD
Base of Salt	4920'	
Delaware	5175' Oil	AUG 10 2013
Bone Spring	9032' Oil	
Wolfcamp	12,189'	RECEIVED
TD TVD	11,040'	
TD MD	15,600'	

1400' 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 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.

3. Proposed Casing Program: All casing is new and API approved

See COA

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' - 5100'	Intrmd	9 5/8"	New	40#	LTC	J-55	1.125	1.125	1.6
7 7/8"	0' - 15,600'	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.

See COA

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

HOESS OGD

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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
(14.8 ppg / 1.34 cuft/sx)

*See
COA*

*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
COA* [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:

Depth	Type System	Mud Weight	Viscosity (sec)	Waterloss (cc)
0' - 1300'	Fresh Water	8.4	29	N.C.
1300' - 5100'	Brine	10	29	N.C.
5100' - 15,600' (Lateral)	Cut Brine	8.9 - 9.2	29	N.C.

See COA 1400' 5200' HOESS OCD AUG 10 2013

- 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:

- 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:

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

10. Potential Hazards:

- a. No abnormal pressures or temperatures are expected. There is no known presence of H2S in this area. If H2S is encountered the operator will comply with the provisions of Onshore Oil and Gas Order No. 6. 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 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.



COG Operating LLC

Lea County, NM

Roy Batty Federal Com

#3H

OH

Plan: Design #1

Standard Planning Report

17 May, 2013

HOEBS OCD

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Planning Report



Database:	test	Local Co-ordinate Reference:	Well #3H
Company:	COG Operating LLC	TVD Reference:	WELL @ 3625.6usft (Silver Oak 12)
Project:	Lea County, NM	MD Reference:	WELL @ 3625.6usft (Silver Oak 12)
Site:	Roy Batty Federal Com	North Reference:	Grid
Well:	#3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

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		

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

Well	#3H					
Well Position	+N/-S	10.3 usft	Northing:	446,575.00 usft	Latitude:	32° 13' 30.948 N
	+E/-W	1,501.4 usft	Easting:	745,259.10 usft	Longitude:	103° 32' 24.818 W
Position Uncertainty	3.0 usft		Wellhead Elevation:		Ground Level:	3,607.6 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/17/2013	7.34	60.15	48,427

Design	Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	359.48

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	
10,572.5	0.00	0.00	10,572.5	0.0	0.0	0.00	0.00	0.00	0.00	
11,323.6	90.13	359.48	11,050.0	478.6	-4.3	12.00	12.00	0.00	359.48	
15,600.1	90.13	359.48	11,040.3	4,754.8	-43.2	0.00	0.00	0.00	0.00	PBHL(RB#3H)



Planning Report



Database: test
Company: COG Operating LLC
Project: Lea County, NM
Site: Roy Batty Federal Corn
Well: #3H
Wellbore: OH
Design: Design #1

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

Well #3H
WELL @ 3625.6usft (Silver Oak 12)
WELL @ 3625.6usft (Silver Oak 12)
Grid
Minimum Curvature

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)
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



Planning Report



Database: test	Local Co-ordinate Reference: Well #3H
Company: COG Operating LLC	TVD Reference: WELL @ 3625.6usft (Silver Oak 12)
Project: Lea County, NM	MD Reference: WELL @ 3625.6usft (Silver Oak 12) OCD
Site: Roy Batty Federal Coin	North Reference: Grid
Well: #3H	Survey Calculation Method: Minimum Curvature
Wellbore: OH	
Design: Design #1	

AUG 10 2013

Planned Survey

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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
10,572.5	0.00	0.00	10,572.5	0.0	0.0	0.0	0.00	0.00	0.00

Database:	test	Local Co-ordinate Reference:	Well, #3H
Company:	COG Operating LLC	TVD Reference:	WELL @ 3625.6usft (Silver Oak 12)
Project:	Lea County, NM	MD Reference:	WELL @ 3625.6usft (Silver Oak 12)
Site:	Roy Batty Federal Com	North Reference:	Grid
Well:	#3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

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 @ 10572.5' MD									
10,575.0	0.30	359.48	10,575.0	0.0	0.0	0.0	12.00	12.00	0.00
10,600.0	3.30	359.48	10,600.0	0.8	0.0	0.8	12.00	12.00	0.00
10,625.0	6.30	359.48	10,624.9	2.9	0.0	2.9	12.00	12.00	0.00
10,650.0	9.30	359.48	10,649.7	6.3	-0.1	6.3	12.00	12.00	0.00
10,675.0	12.30	359.48	10,674.2	11.0	-0.1	11.0	12.00	12.00	0.00
10,700.0	15.30	359.48	10,698.5	16.9	-0.2	16.9	12.00	12.00	0.00
10,725.0	18.30	359.48	10,722.4	24.1	-0.2	24.1	12.00	12.00	0.00
10,750.0	21.30	359.48	10,745.9	32.6	-0.3	32.6	12.00	12.00	0.00
10,775.0	24.30	359.48	10,769.0	42.3	-0.4	42.3	12.00	12.00	0.00
10,800.0	27.30	359.48	10,791.5	53.2	-0.5	53.2	12.00	12.00	0.00
10,825.0	30.30	359.48	10,813.4	65.2	-0.6	65.2	12.00	12.00	0.00
10,850.0	33.30	359.48	10,834.6	78.4	-0.7	78.4	12.00	12.00	0.00
10,875.0	36.30	359.48	10,855.2	92.7	-0.8	92.7	12.00	12.00	0.00
10,900.0	39.30	359.48	10,874.9	108.0	-1.0	108.0	12.00	12.00	0.00
10,925.0	42.30	359.48	10,893.8	124.3	-1.1	124.3	12.00	12.00	0.00
10,950.0	45.30	359.48	10,911.9	141.6	-1.3	141.6	12.00	12.00	0.00
10,975.0	48.30	359.48	10,929.0	159.8	-1.5	159.8	12.00	12.00	0.00
11,000.0	51.30	359.48	10,945.1	178.9	-1.6	178.9	12.00	12.00	0.00
11,025.0	54.30	359.48	10,960.3	198.8	-1.8	198.8	12.00	12.00	0.00
11,050.0	57.30	359.48	10,974.3	219.5	-2.0	219.5	12.00	12.00	0.00
11,075.0	60.30	359.48	10,987.3	240.9	-2.2	240.9	12.00	12.00	0.00
11,100.0	63.30	359.48	10,999.1	262.9	-2.4	262.9	12.00	12.00	0.00
11,125.0	66.29	359.48	11,009.7	285.5	-2.6	285.5	12.00	12.00	0.00
11,150.0	69.29	359.48	11,019.2	308.7	-2.8	308.7	12.00	12.00	0.00
11,175.0	72.29	359.48	11,027.4	332.3	-3.0	332.3	12.00	12.00	0.00
11,200.0	75.29	359.48	11,034.4	356.3	-3.2	356.3	12.00	12.00	0.00
11,225.0	78.29	359.48	11,040.1	380.6	-3.5	380.6	12.00	12.00	0.00
11,250.0	81.29	359.48	11,044.5	405.2	-3.7	405.2	12.00	12.00	0.00
11,275.0	84.29	359.48	11,047.6	430.0	-3.9	430.0	12.00	12.00	0.00
11,300.0	87.29	359.48	11,049.5	454.9	-4.1	455.0	12.00	12.00	0.00
11,323.6	90.13	359.48	11,050.0	478.6	-4.3	478.6	12.00	12.00	0.00
EOC @ 11323.6' MD, 90.13° INC, 359.48° AZI									
11,400.0	90.13	359.48	11,049.8	554.9	-5.0	554.9	0.00	0.00	0.00
11,500.0	90.13	359.48	11,049.6	654.9	-5.9	654.9	0.00	0.00	0.00
11,600.0	90.13	359.48	11,049.4	754.9	-6.9	754.9	0.00	0.00	0.00
11,700.0	90.13	359.48	11,049.1	854.9	-7.8	854.9	0.00	0.00	0.00
11,800.0	90.13	359.48	11,048.9	954.9	-8.7	954.9	0.00	0.00	0.00
11,900.0	90.13	359.48	11,048.7	1,054.9	-9.6	1,054.9	0.00	0.00	0.00
12,000.0	90.13	359.48	11,048.5	1,154.9	-10.5	1,154.9	0.00	0.00	0.00
12,100.0	90.13	359.48	11,048.2	1,254.9	-11.4	1,254.9	0.00	0.00	0.00
12,200.0	90.13	359.48	11,048.0	1,354.9	-12.3	1,354.9	0.00	0.00	0.00
12,300.0	90.13	359.48	11,047.8	1,454.9	-13.2	1,454.9	0.00	0.00	0.00
12,400.0	90.13	359.48	11,047.6	1,554.9	-14.1	1,554.9	0.00	0.00	0.00
12,500.0	90.13	359.48	11,047.3	1,654.9	-15.0	1,654.9	0.00	0.00	0.00
12,600.0	90.13	359.48	11,047.1	1,754.9	-15.9	1,754.9	0.00	0.00	0.00
12,700.0	90.13	359.48	11,046.9	1,854.9	-16.8	1,854.9	0.00	0.00	0.00
12,800.0	90.13	359.48	11,046.7	1,954.9	-17.7	1,954.9	0.00	0.00	0.00
12,900.0	90.13	359.48	11,046.4	2,054.9	-18.6	2,054.9	0.00	0.00	0.00
13,000.0	90.13	359.48	11,046.2	2,154.9	-19.6	2,154.9	0.00	0.00	0.00
13,100.0	90.13	359.48	11,046.0	2,254.8	-20.5	2,254.9	0.00	0.00	0.00
13,200.0	90.13	359.48	11,045.7	2,354.8	-21.4	2,354.9	0.00	0.00	0.00
13,300.0	90.13	359.48	11,045.5	2,454.8	-22.3	2,454.9	0.00	0.00	0.00
13,400.0	90.13	359.48	11,045.3	2,554.8	-23.2	2,554.9	0.00	0.00	0.00

Database:	test	Local Co-ordinate Reference:	Well #3H
Company:	COG Operating LLC	TVD Reference:	WELL @ 3625.6usft (Silver Oak 12)
Project:	Lea County, NM	MD Reference:	WELL @ 3625.6usft (Silver Oak 12)
Site:	Roy Batty Federal Com	North Reference:	Grid
Well:	#3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

AUG 10 2013

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	359.48	11,045.1	2,654.8	-24.1	2,654.9	0.00	0.00	0.00
13,600.0	90.13	359.48	11,044.8	2,754.8	-25.0	2,754.9	0.00	0.00	0.00
13,700.0	90.13	359.48	11,044.6	2,854.8	-25.9	2,854.9	0.00	0.00	0.00
13,800.0	90.13	359.48	11,044.4	2,954.8	-26.8	2,954.9	0.00	0.00	0.00
13,900.0	90.13	359.48	11,044.2	3,054.8	-27.7	3,054.9	0.00	0.00	0.00
14,000.0	90.13	359.48	11,043.9	3,154.8	-28.6	3,154.9	0.00	0.00	0.00
14,100.0	90.13	359.48	11,043.7	3,254.8	-29.5	3,254.9	0.00	0.00	0.00
14,200.0	90.13	359.48	11,043.5	3,354.8	-30.4	3,354.9	0.00	0.00	0.00
14,300.0	90.13	359.48	11,043.2	3,454.8	-31.4	3,454.9	0.00	0.00	0.00
14,400.0	90.13	359.48	11,043.0	3,554.8	-32.3	3,554.9	0.00	0.00	0.00
14,500.0	90.13	359.48	11,042.8	3,654.8	-33.2	3,654.9	0.00	0.00	0.00
14,600.0	90.13	359.48	11,042.6	3,754.8	-34.1	3,754.9	0.00	0.00	0.00
14,700.0	90.13	359.48	11,042.3	3,854.8	-35.0	3,854.9	0.00	0.00	0.00
14,800.0	90.13	359.48	11,042.1	3,954.8	-35.9	3,954.9	0.00	0.00	0.00
14,900.0	90.13	359.48	11,041.9	4,054.8	-36.8	4,054.9	0.00	0.00	0.00
15,000.0	90.13	359.48	11,041.7	4,154.8	-37.7	4,154.9	0.00	0.00	0.00
15,100.0	90.13	359.48	11,041.4	4,254.8	-38.6	4,254.9	0.00	0.00	0.00
15,200.0	90.13	359.48	11,041.2	4,354.8	-39.5	4,354.9	0.00	0.00	0.00
15,300.0	90.13	359.48	11,041.0	4,454.8	-40.4	4,454.9	0.00	0.00	0.00
15,400.0	90.13	359.48	11,040.8	4,554.7	-41.3	4,554.9	0.00	0.00	0.00
15,500.0	90.13	359.48	11,040.5	4,654.7	-42.2	4,654.9	0.00	0.00	0.00
15,600.1	90.13	359.48	11,040.3	4,754.8	-43.2	4,755.0	0.00	0.00	0.00

TD at 15600.1 - PBHL(RB#3H)

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
PBHL(RB#3H)	0.00	0.00	11,040.0	4,754.8	-42.8	451,329.80	745,216.30	32° 14' 18.002 N	103° 32' 24.908 W
- plan misses target center by 0.5usft at 15600.1usft MD (11040.3 TVD, 4754.8 N, -43.2 E)									
- Point									

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
10,572.5	10,572.5	0.0	0.0	KOP @ 10572.5' MD
11,323.6	11,050.0	478.6	-4.3	EOC @ 11323.6' MD, 90.13° INC, 359.48° AZI
15,600.1	11,040.3	4,754.8	-43.2	TD at 15600.1



COG Operating LLC
Project: Lea County, NM
Site: Roy Batty Federal Com
Well: #3H
Wellbore: OH
Plan: Design #1 (#3H/OH)

Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VFace	
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	10572.5	0.00	0.00	10572.5	0.0	0.0	0.00	0.00	0.0	
3	11323.6	90.13	359.48	11050.0	478.6	-4.3	12.00	359.48	478.6	
4	15600.1	90.13	359.48	11040.3	4754.8	-43.2	0.00	0.00	4755.0	PBHL(RB#3H)

WELL DETAILS: #3H

Ground Elevation:: 3607.6
RKB Elevation: WELL @ 3625.6usft (Silver Oak 12)
Rig Name: Silver Oak 12

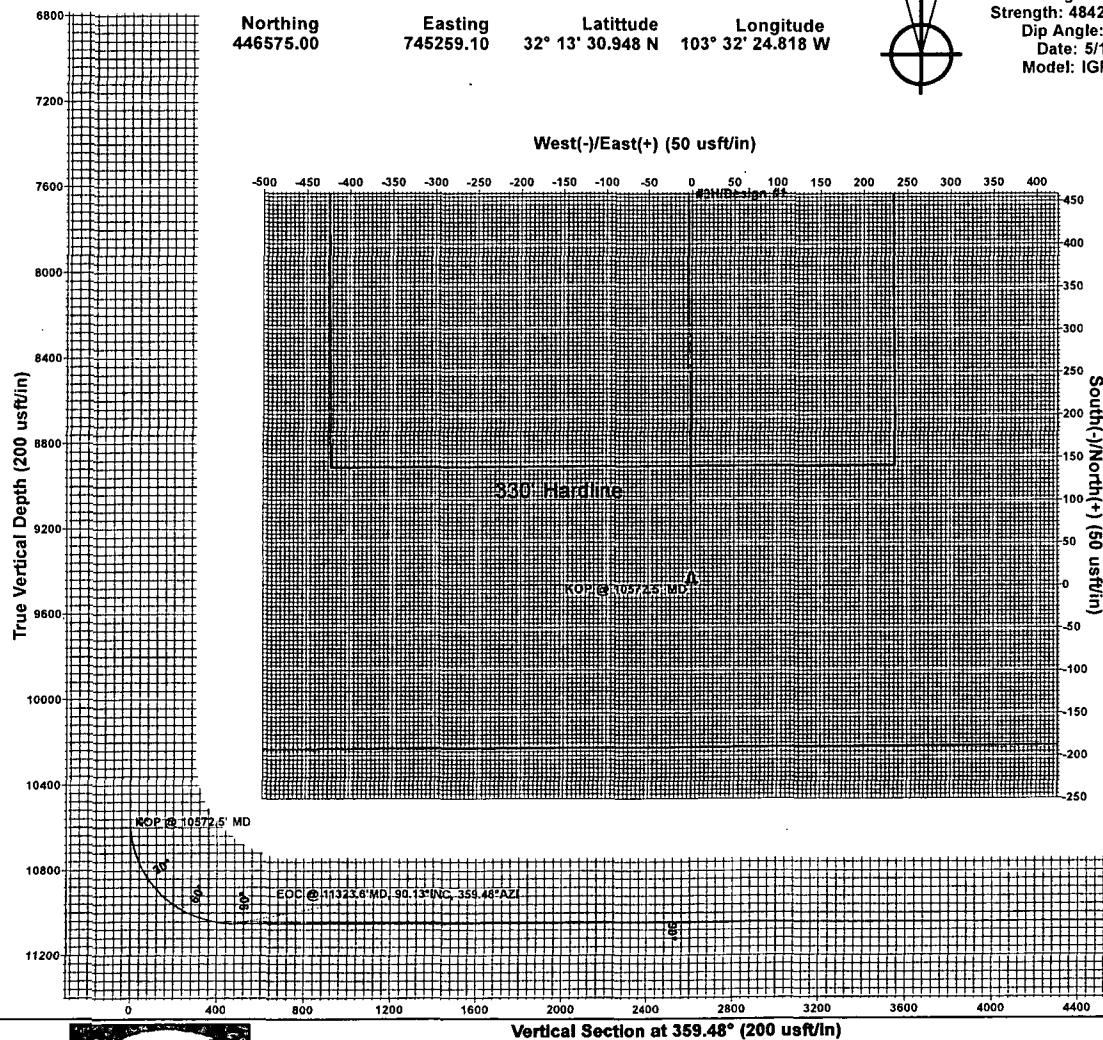
Northing 446575.00 Easting 745259.10 Latitude 32° 13' 30.948 N Longitude 103° 32' 24.818 W



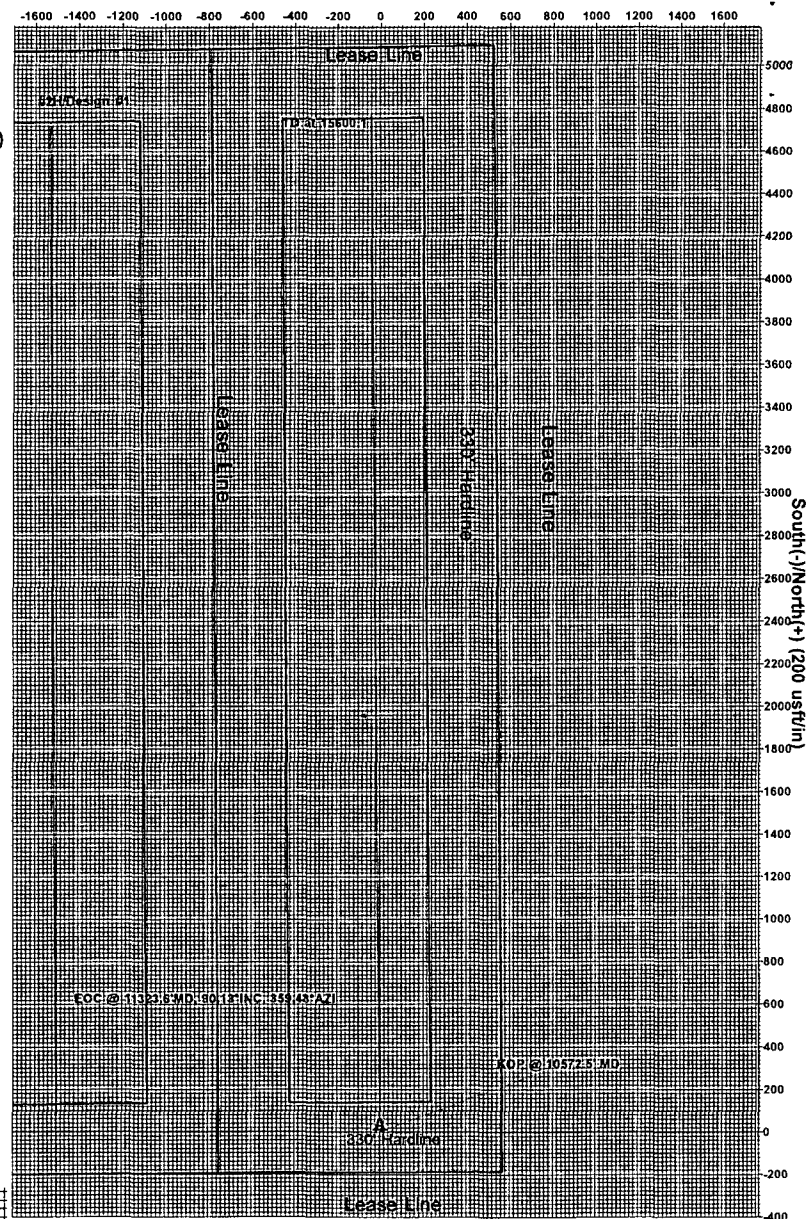
Azimuths to Grid North
True North: -0.42°
Magnetic North: 6.91°

Magnetic Field
Strength: 48427.0snT
Dip Angle: 60.15°
Date: 5/17/2013
Model: IGRF2010

West(-)/East(+) (50 usft/in)



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



H0233 OOD

AUG 10 2013

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

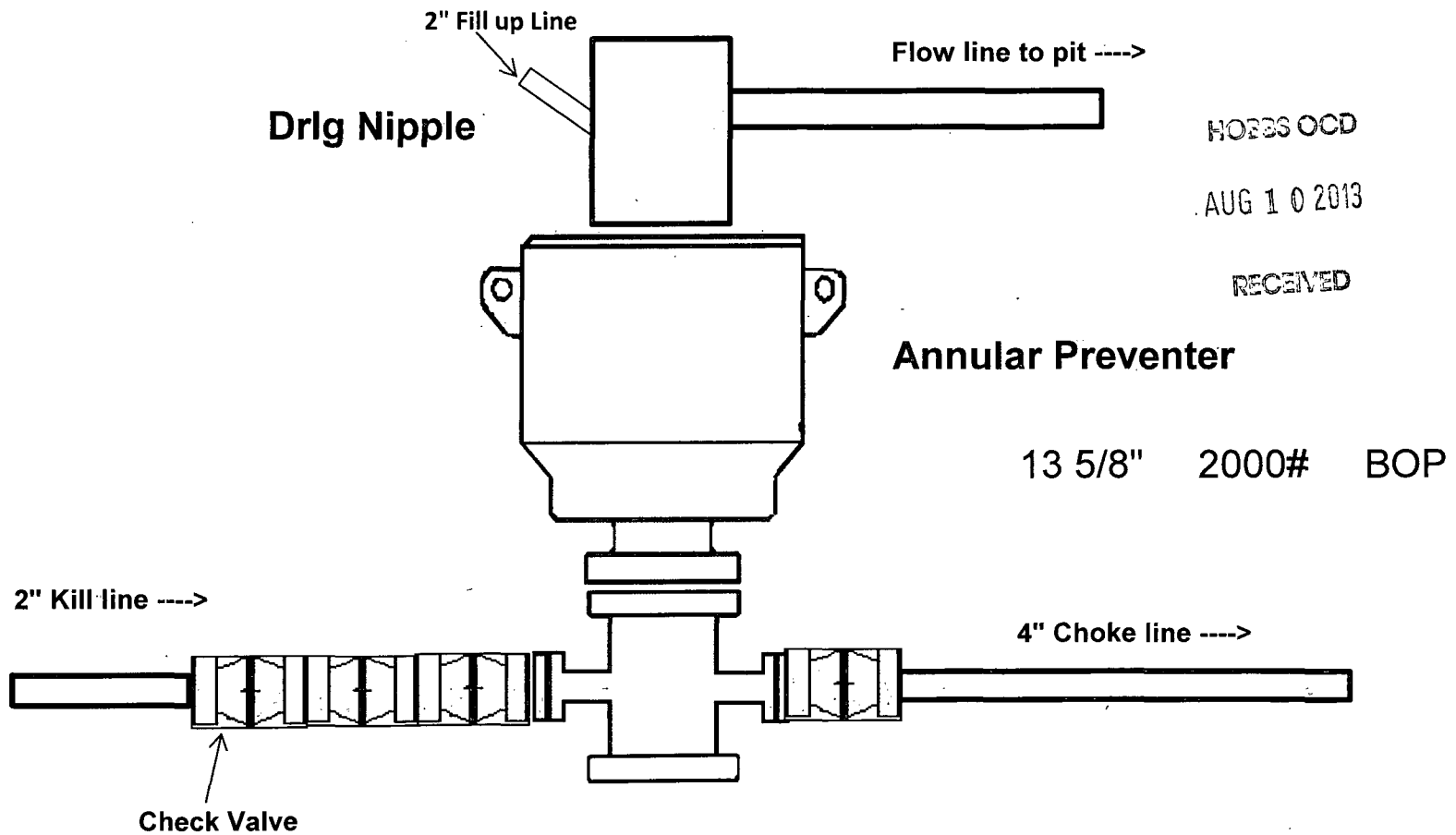
Plan: Design #1 (#3H/OH)
Created By: Well Planner Date: 10:18, May 17 2013



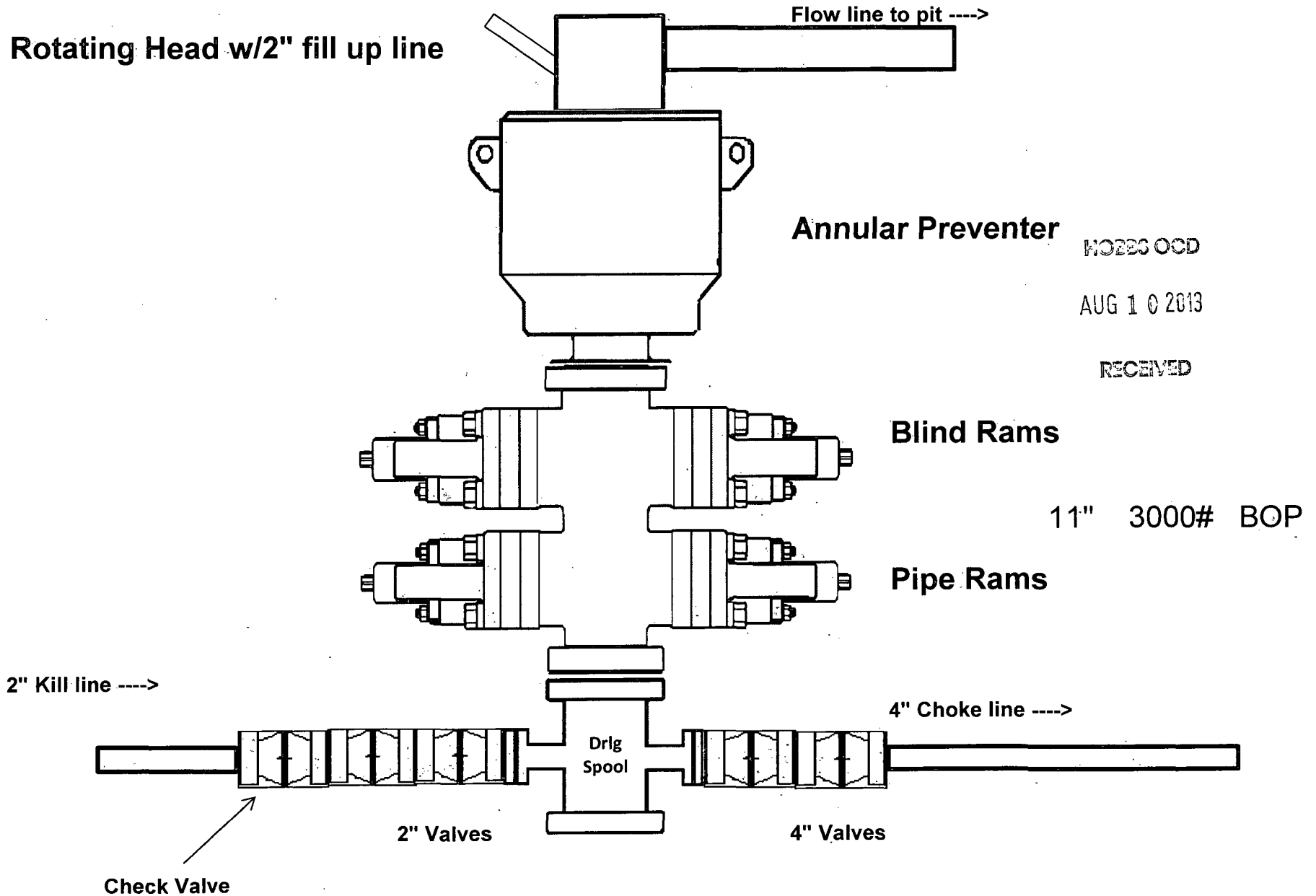
Vertical Section at 359.48° (200 usft/in)

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

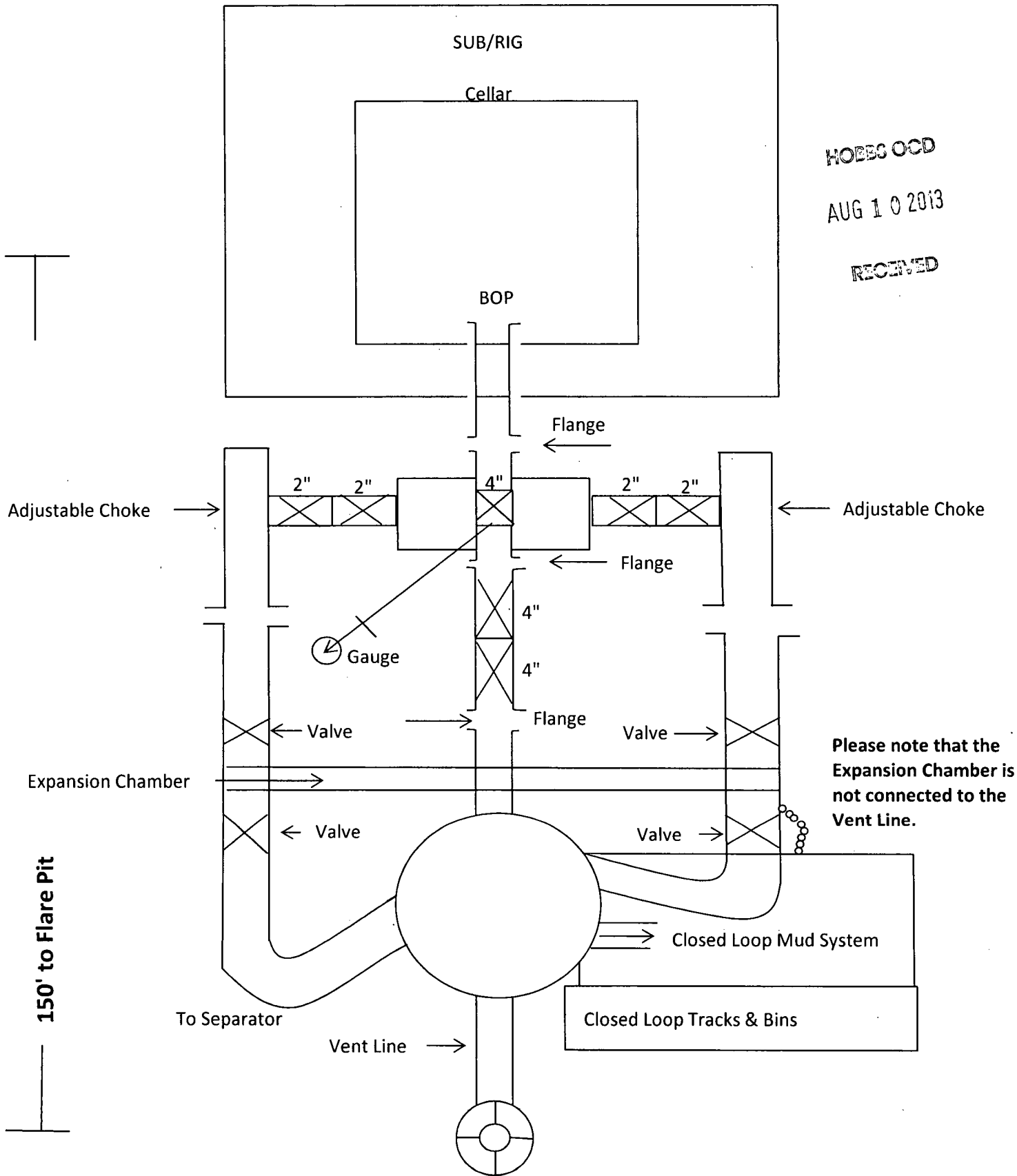
2,000 psi BOP Schematic



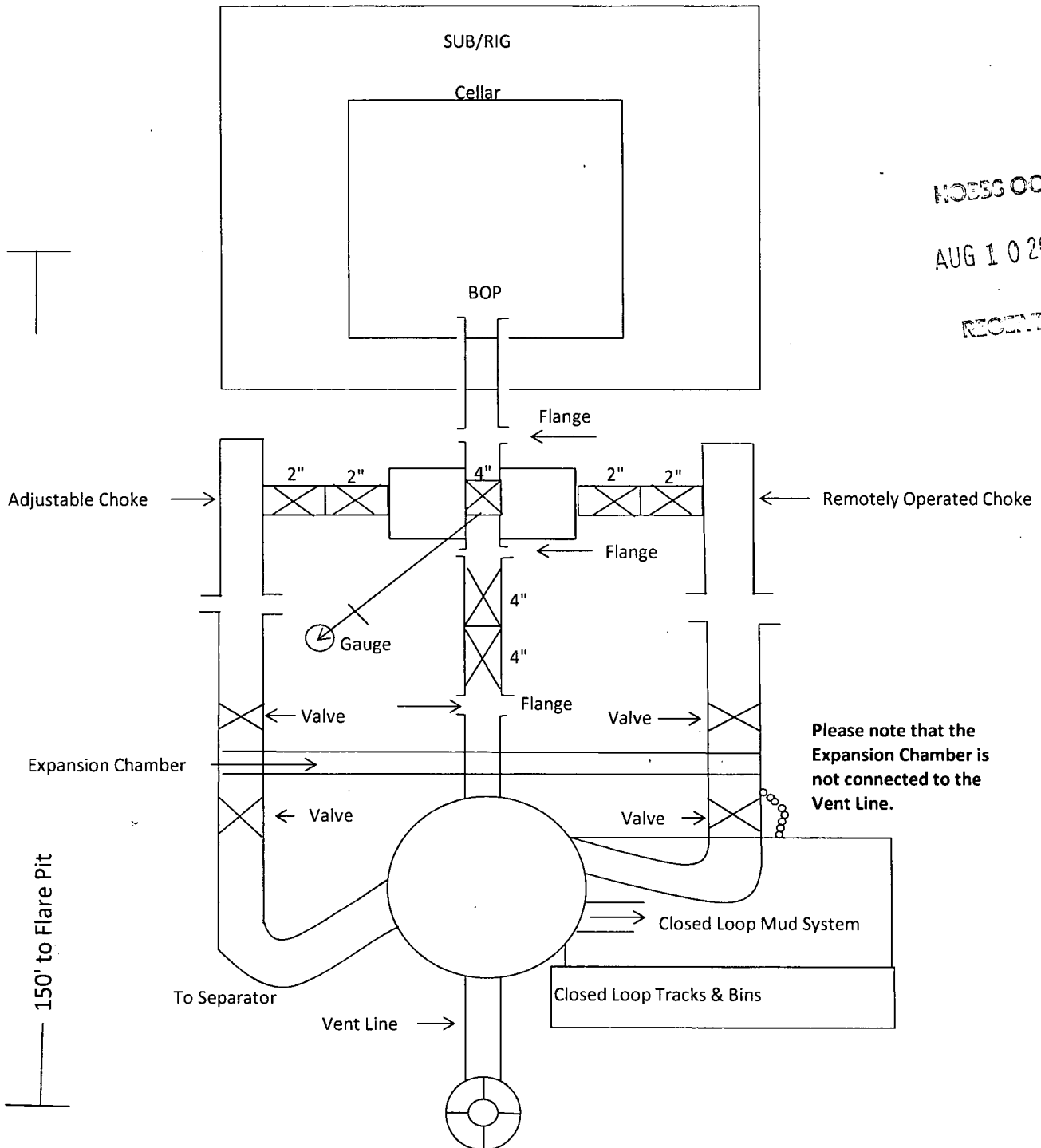
3,000 psi BOP Schematic



2M Choke Manifold Equipment



3M Choke Manifold Equipment



HOESS OGD
AUG 10 2013
RECEIVED