

Form 3160-3 HOBBS OCD
(March 2012)
DEC 16 2013
RECEIVED

ATS-13-888

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

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		LOCATION	
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		2. Name of Operator COG Production LLC. 217955	
3a. Address 2208 West Main Street Artesia, NM 88210		3b. Phone No. (include area code) 575-748-6940	
4. Location of Well (Report location clearly and in accordance with any State requirements.)* At surface 190' FNL & 1650' FWL Unit Letter C (NENW) SHL Sec. 30 - T24S - R32E At proposed prod. Zone 330' FSL & 1650' FWL Unit Letter N (SESW) BHL Sec. 31 - T24S - R32E		7. If Unit or CA Agreement, Name and No. 8. Lease Name and Well No. 40280 King Tut Federal #2H 9. API Well No. 30-025-41558	
14. Distance in miles and direction from nearest town or post office* Approximately 20 miles from Malaga		10. Field and Pool, or Exploratory Cotton Draw; Delaware, SE 96629	
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. 30 - T24S - R32E	
16. No. of acres in lease 1891.72		12. County or Parish Lea County	
17. Spacing Unit dedicated to this well 320		13. State NM	
18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. SHL: 100' (Windward Federal #2H) BHL: 1980'		20. BLM/BIA Bond No. on file NMB000845 & NMB000860	
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3542.9' GL		22. Approximate date work will start* 12/1/2013	
		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:

- 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 Mayte Reyes	Name (Printed/Typed) Mayte Reyes	Date 9/23/2013
Title Regulatory Analyst		
Approved by (Signature) /s/ STEPHEN J. CAPTEV	Name (Printed/Typed)	Date DEC 11 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 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)

Carlsbad Controlled Water Basin (page 2)

Approval Subject to General Requirements
& Special Stipulations Attached

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

12/16/13
DEC 17 2013

ATTACHMENT TO FORM 3160-3
COG Operating, LLC
KING TUT FEDERAL #2H
SHL: 190' FNL & 1650' FWL, Unit C
Sec. 30 T24S R32E
BHL: 330' FSL & 1650' FWL, Unit N
Sec 31, T24S, R32E
Lea County, NM

1. **Proration Unit Spacing:** 320 Acres
2. **Ground Elevation:** 3542.9'
3. **Proposed Depths:** Horizontal: EOC (end of curve) TVD = 8430' MD = 8704'
Toe (end of lateral) TVD = 8390' MD= 18266'
4. **Estimated tops of geological markers: (TVD)**

Fresh Water	290'
Rustler	742'
Top of Salt	1074'
Base of Salt	4348'
Lamar	4589'
Bell Canyon	4615'
Cherry Canyon	5518'
Brushy Canyon	6897'
Brushy Canyon – A	8182'
Brushy Canyon-2	8410'
Bone Spring	8467'

5. **Possible mineral bearing formations:**

Bell Canyon	4615'	Oil/Gas
Cherry Canyon	5518'	Oil/Gas
Brushy Canyon	6897'	Oil/Gas
Brushy Canyon –A	8182'	Oil/Gas
Brushy Canyon-2	8410'	Oil/Gas
Bone Spring	8467'	Oil/Gas

No other formations are expected to give up oil, gas or fresh water in measurable quantities. Setting 13 3/8" casing to ~~770'~~ ^{815'} and circulating cement back to the surface will protect the surface fresh water sand. The Salt Section will be protected by setting 9 5/8" casing to ~~4600'~~ ^{4550'} and circulating cement back to surface. Any zones between 9 5/8" casing shoe and TD, which contain commercial quantities of oil and/or gas will have cement circulated across them. This will be achieved by cementing 5 1/2" production casing from the TD to surface.

ATTACHMENT TO FORM 3160-3
COG Operating, LLC
KING TUT FEDERAL #2H
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6. Proposed Mud System

The well will be drilled to TD with a combination of fresh water, brine, cut brine and polymer mud systems. The applicable depths and properties of these systems are as follows:

See COA

DEPTH (MD)	TYPE	WEIGHT	VISCOSITY	WATERLOSS
0-770' 815'	Fresh Water	8.4	29	N.C.
770'-4600' 4350'	Brine	10	29	N.C.
4600'-18266'	Cut Brine	8.9-9.2	29	N.C.

Sufficient mud materials will be kept at the well site to maintain mud properties and meet minimum lost circulation and weight increase requirements at all times.

Visual or electronic mud monitoring equipment shall be in place to detect volume changes indicating loss or gain of circulating fluid volume.

The mud program has been designed to minimize the volume of H₂S circulated to surface. Proper mud weights, safe drilling practices and the use of H₂S scavengers will minimize hazards when penetrating H₂S bearing zones.

7. Proposed Casing Program

See COA

Hole Size	Interval MD	OD Casing	Weight	Grade	Condition	Jt.	brst/clps/ten
17 1/2"	0-770' 815'	13 3/8" 0-770'	54.5#	J-55	New	ST&C	3.41/3.64/14.45
12 1/4"	770'-4600' 4350'	9 5/8" 0-4600'	40#	J-55	New	LT&C	2.14/1.09/3.37
7 7/8"	4600'-18266'	5 1/2" 0-18266'	17#	P-110	New	LT&C	1.33/1.97/3.84

8. Proposed Cement Program

13 3/8" SURFACE: (Circulate to Surface)

Lead: 325 sks
0'-500'
Excess 64%

Class "C" + 4% Gel
+ 2% CaCl₂

Yield
1.75 cf/sk

Density
13.5 ppg

Mix
Water
9.2 gal/sk

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COG Operating, LLC
KING TUT FEDERAL #2H
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	<u>Yield</u>	<u>Density</u>	<u>Mix Water</u>
Tail: 250 sks Class C w/2% CaCl ₂ 500'-770' Excess 48% Combined open hole excess 58%.	1.32 cf/sk	14.8 ppg	6.3 gal/sk

9 5/8" INTERMEDIATE CASING:

Single Stage: (Circulate to Surface)

1 st Lead: 175 sks 0'-770' Excess 21%	EconoCem-HLC + 5% Salt +5 pps Kol-Seal	2.00 cf/sk	12.7 ppg	10.6 gal/sk
2 nd Lead:* 675 sks 770'-4000' Excess 33%	EconoCem-HLC + 5% Salt +5 pps Kol-Seal	2.00 cf/sk	12.7 ppg	10.6 gal./sk.
Tail:* 225 sks 4000'-4600' Excess 45%	Class C w/2% CaCl ₂	1.32 cf/sk	14.8 ppg	6.3 gal./sk.

* open hole
Combined OH excess 35%

5 1/2" PRODUCTION CASING:

Single Stage: (Cement calculated to surface. Minimum tie back 200' above 9 5/8" intermediate casing)

Lead: 0'-4600' (min. tie-back 200' above 9 5/8" shoe) Excess 15%	550 sks EconoCem-H +0.5 % Halad-322+ 5 pps Kol-Seal+ 0.25 pps D-Air 5000 + 0.2% HR-601	2.51 cf/sk	11.9 ppg	14.2 gal/sk.
Lead:* 4600'-7953'(KOP) 310 sks Excess 34%	EconoCem-H +0.5% Halad-322+ 5 pps Kol-Seal+ 0.25 pps D-Air 5000 + 0.2% HR 601	2.51 cf/sk	11.9 ppg	14.2 gal/sk

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Tail:*

7953'(KOP) - 18266' 2000 sks VersaCem + 0.4% GasStop 1.24 cf/sk 14.4 ppg 5.7 gal/sk
Excess 38% + 0.3% CFR-3 + 1 % Salt
+ 1% HR-601

*open hole

Combined OH Excess 37%

8. Pressure Control Equipment:

See COA
A 13 5/8" 2000 psi Hydril type annular preventer with mud cross, choke manifold, chokes, kill line, Kelly cock, safety valve and subs to fit all drill strings in use as provided for in Onshore Order #2 will be nipples up on the 13 3/8" x 2000 psi SOW X 13 5/8" x 2000 psi casing head (see attached BOPE drawings). This unit will be hydraulically operated and will be tested by independent tester using test plug to 250 psig/300 psig low and 1000 psig high. Choke line valve, chokes, upper Kelly cock valve, safety valve shall also be tested to 250 psig/300 psig low and 1000 psig high by independent tester.

See COA
After setting the 9 5/8" intermediate casing the following BOPE as provided for in Onshore Order #2 will be rigged up on the 9 5/8" intermediate casing spool (13 5/8" 2000 psi x 13 5/8" 3000 psi): 13 5/8" X 3000 psi annular, 13 5/8" X 3000 psi double ram type preventer with blind rams on top and 4 1/2" drill pipe rams on the bottom, choke, mud cross, choke manifold, 4" diameter choke line, 2" kill line, kelly cock, safety valve with proper subs for all drill string connections in use (see attached BOPE drawings). The BOPE including auxiliary equipment (chokes, choke manifold etc.) will be tested by independent tester..

A test plug will be used and all BOPE tested to 250 psig/ 300 psig low pressure and 3000 psig high pressure for 10 minutes. Annular preventer will be tested to 1500 psig. BOP stack will be used continuously until total depth is reached. 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. Any time a component of the BOP stack or choke manifold is changed or installed BOPE will be re-tested as required.

All casing strings below the conductor shall be pressure tested to 0.22 psi per foot of casing string depth or 1500 psig, whichever is greater, but not to exceed 70 percent of casing's minimum internal yield. If pressure declines more than 10 percent in 30 minutes, corrective action will be taken.

9. Production Hole Drilling Summary:

Drill 7 7/8" hole to 7953'. Kick off at +/- 7953', building curve at 12°/100' to 90.24° inclination at 8705' MD/8430' TVD az 179.60°. Continue lateral section at 90.24° inc., az 179.60° for +/-9562' lateral to TD at +/-18266' MD/ 8390' TVD. Run 5-1/2" production casing. 5 1/2" casing will be isolated by a single stage cement job. Cement will be calculated to surface (min tie back is 200' above 9 5/8" csq shoe).

10. Auxiliary Well Control and Monitoring Equipment

- A. Kelly cock will be kept in the drill string at all times.

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COG Operating, LLC
KING TUT FEDERAL #2H
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- B. A full opening drill pipe-stabbing valve with proper drill pipe connections will be on the rig floor at all times.

12. Logging, Testing and Coring Program:

- A. Cased hole logs only.
- B. The mud logging program will consist of lagged 20' samples from intermediate casing shoe to KOP and thru curve and lateral to TD.
- C. Drill Stem test is not anticipated
- D. No conventional coring is anticipated.
- E. Further testing procedures will be determined after the 5 ½" production casing has been cemented at TD based on drill shows and log evaluation.

12. Abnormal Conditions, Pressures, Temperatures and Potential Hazards:

No abnormal pressures or temperatures are anticipated. The estimated bottom hole temperature is 107° Fahrenheit and estimated maximum bottom hole pressure is 3614 psi.. Wells in the Paduca North area will penetrate formations that are known or could reasonably be expected to contain hydrogen sulfide. Measurable gas volumes or hydrogen sulfide levels have **not** been encountered during drilling operations in this area; however, a H2S drilling operations plan is included with this APD. Hydrogen Sulfide detection equipment will be operational and breathing equipment will be on location after drilling out the 13 3/8" casing shoe and until the 5 ½" casing is cemented. If H2S concentrations exceed 100 ppm the well will be shut-in and a remote operated choke will be installed. COG will comply with Onshore Order #6. All BOPE testing companies used by COG have H2S certified employees and will work on H2S locations. No major loss circulation zones have been reported in offsetting wells.

13. Anticipated Starting Date

Drilling operations will commence on approximately **November 30, 2013** with drilling and completion operations lasting approximately **90** days.

GEG/09.09.13



COG Production LLC

**Lea County, NM
King Tut Federal
#2H**

OH

Plan: Design #1

Standard Planning Report

19 August, 2013



COG Production LLC
Project: Lea County, NM
Site: King Tut Federal
Well: #2H
Wellbore: OH
Plan: Design #1 (#2H/OH)

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	7952.5	0.00	0.00	7952.5	0.0	0.0	0.00	0.00	0.0
3	8704.6	90.24	179.60	8430.0	-479.5	3.3	12.00	179.60	479.5
4	18266.4	90.24	179.60	8389.9	-10041.0	70.1	0.00	0.00	10041.3

PBHL(KT#2H)

WELL DETAILS: #2H

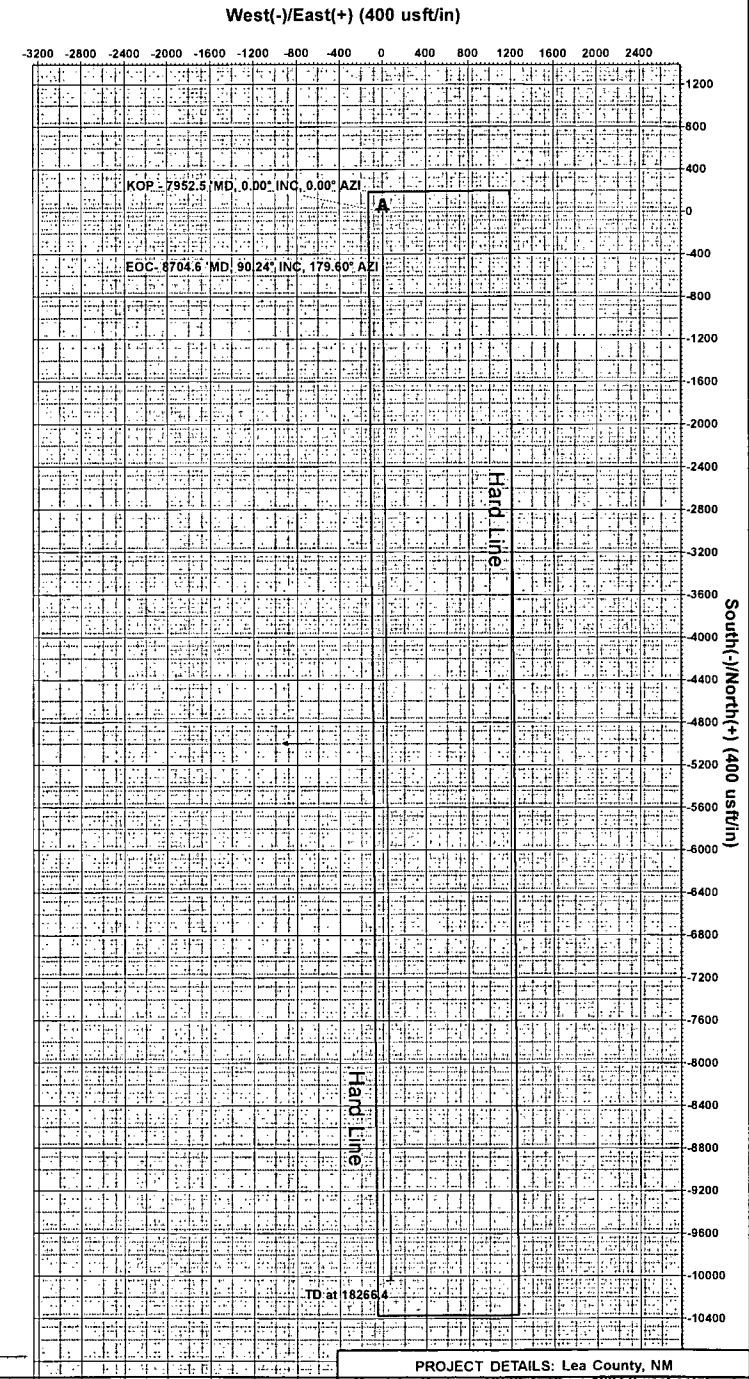
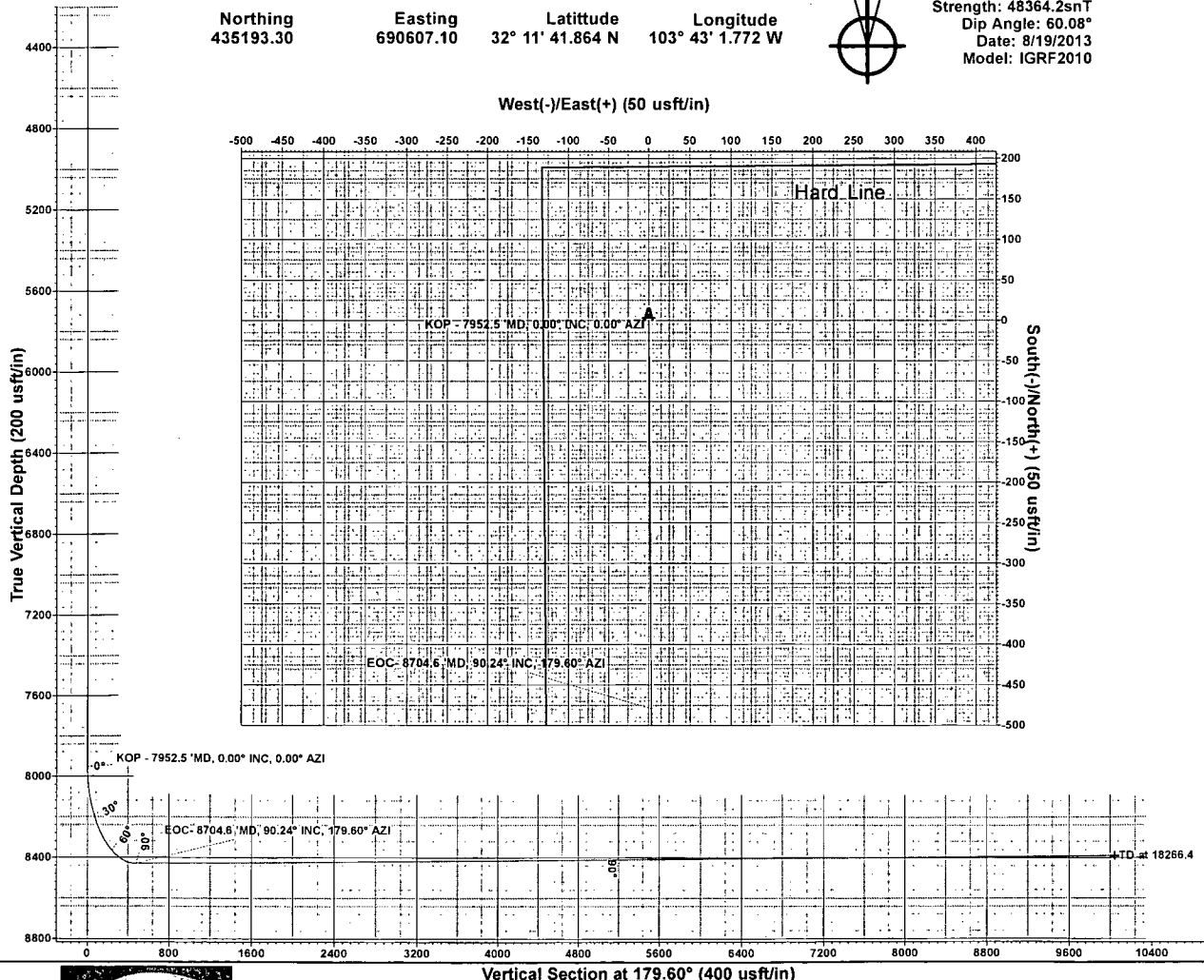
Ground Elevation:: 3542.9
RKB Elevation: WELL @ 3572.9usft (Original Well Elev)
Rig Name: Original Well Elev

Northing 435193.30 Easting 690607.10 Latitude 32° 11' 41.864 N Longitude 103° 43' 1.772 W



Azimuths to Grid North
True North: -0.33°
Magnetic North: 7.05°

Magnetic Field
Strength: 48364.2snT
Dip Angle: 60.08°
Date: 8/19/2013
Model: IGRF2010



Plan: Design #1 (#2H/OH)
reated By: Well Planner Date: 18:04, August 19 2013

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

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



Wellplanning Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #2H
Company:	COG Production LLC	TVD Reference:	WELL @ 3572.9usft (Original Well Elev)
Project:	Lea County, NM	MD Reference:	WELL @ 3572.9usft (Original Well Elev)
Site:	King Tut Federal	North Reference:	Grid
Well:	#2H	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:	King Tut Federal		
Site Position:	Map	Northing:	435,193.30 usft
From:		Easting:	690,607.10 usft
Position Uncertainty:	2.0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 11' 41.864 N
		Longitude:	103° 43' 1.772 W
		Grid Convergence:	0.33 °

Well:	#2H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	Ground Level:
			3,542.9 usft

Wellbore:	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	8/19/2013	7.38
			Dip Angle
			(°)
			60.08
			Field Strength
			(nT)
			48,364

Design:	Design #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			179.60

Plan Sections										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Dogleg	Build	Turn	TFO	Target
Depth	(°)	(°)	Depth	(usft)	(usft)	Rate	Rate	Rate	(°)	
(usft)			(usft)			(°/100usft)	(°/100usft)	(°/100usft)		
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
7,952.5	0.00	0.00	7,952.5	0.0	0.0	0.00	0.00	0.00	0.00	
8,704.6	90.24	179.60	8,430.0	-479.5	3.3	12.00	12.00	0.00	179.60	
18,266.4	90.24	179.60	8,389.9	-10,041.0	70.1	0.00	0.00	0.00	0.00	PBHL(KT#2H)



Wellplanning Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #2H
Company:	COG Production LLC	TVD Reference:	WELL @ 3572.9usft (Original Well Elev)
Project:	Lea County, NM	MD Reference:	WELL @ 3572.9usft (Original Well Elev)
Site:	King Tut Federal	North Reference:	Grid
Well:	#2H	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)	
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	



Wellplanning Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #2H
Company:	COG Production LLC	TVD Reference:	WELL @ 3572.9usft (Original Well Elev)
Project:	Lea County, NM	MD Reference:	WELL @ 3572.9usft (Original Well Elev)
Site:	King Tut Federal	North Reference:	Grid
Well:	#2H	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)
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
7,952.5	0.00	0.00	7,952.5	0.0	0.0	0.0	0.00	0.00	0.00
KOP - 7952.5 MD, 0.00° INC, 0.00° AZI									
7,975.0	2.70	179.60	7,975.0	-0.5	0.0	0.5	12.00	12.00	0.00
8,000.0	5.70	179.60	7,999.9	-2.4	0.0	2.4	12.00	12.00	0.00
8,025.0	8.70	179.60	8,024.7	-5.5	0.0	5.5	12.00	12.00	0.00
8,050.0	11.70	179.60	8,049.3	-9.9	0.1	9.9	12.00	12.00	0.00
8,075.0	14.70	179.60	8,073.7	-15.6	0.1	15.6	12.00	12.00	0.00
8,100.0	17.70	179.60	8,097.7	-22.6	0.2	22.6	12.00	12.00	0.00
8,125.0	20.70	179.60	8,121.3	-30.8	0.2	30.8	12.00	12.00	0.00
8,150.0	23.70	179.60	8,144.4	-40.3	0.3	40.3	12.00	12.00	0.00
8,175.0	26.70	179.60	8,167.0	-50.9	0.4	50.9	12.00	12.00	0.00
8,200.0	29.70	179.60	8,189.1	-62.7	0.4	62.7	12.00	12.00	0.00
8,225.0	32.70	179.60	8,210.4	-75.7	0.5	75.7	12.00	12.00	0.00
8,250.0	35.70	179.60	8,231.1	-89.7	0.6	89.7	12.00	12.00	0.00
8,275.0	38.70	179.60	8,251.0	-104.8	0.7	104.8	12.00	12.00	0.00
8,300.0	41.70	179.60	8,270.1	-121.0	0.8	121.0	12.00	12.00	0.00
8,325.0	44.70	179.60	8,288.4	-138.1	1.0	138.1	12.00	12.00	0.00
8,350.0	47.70	179.60	8,305.7	-156.1	1.1	156.1	12.00	12.00	0.00
8,375.0	50.70	179.60	8,322.0	-175.0	1.2	175.0	12.00	12.00	0.00
8,400.0	53.70	179.60	8,337.3	-194.8	1.4	194.8	12.00	12.00	0.00
8,425.0	56.70	179.60	8,351.6	-215.3	1.5	215.3	12.00	12.00	0.00
8,450.0	59.70	179.60	8,364.8	-236.5	1.7	236.6	12.00	12.00	0.00
8,475.0	62.69	179.60	8,376.8	-258.5	1.8	258.5	12.00	12.00	0.00
8,500.0	65.69	179.60	8,387.7	-281.0	2.0	281.0	12.00	12.00	0.00
8,525.0	68.69	179.60	8,397.4	-304.0	2.1	304.0	12.00	12.00	0.00
8,550.0	71.69	179.60	8,405.8	-327.5	2.3	327.5	12.00	12.00	0.00
8,575.0	74.69	179.60	8,413.1	-351.4	2.5	351.5	12.00	12.00	0.00



Wellplanning Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #2H
Company:	COG Production LLC	TVD Reference:	WELL @ 3572.9usft (Original Well Elev)
Project:	Lea County, NM	MD Reference:	WELL @ 3572.9usft (Original Well Elev)
Site:	King Tut Federal	North Reference:	Grid
Well:	#2H	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)
8,600.0	77.69	179.60	8,419.0	-375.7	2.6	375.7	12.00	12.00	0.00
8,625.0	80.69	179.60	8,423.7	-400.3	2.8	400.3	12.00	12.00	0.00
8,650.0	83.69	179.60	8,427.1	-425.0	3.0	425.0	12.00	12.00	0.00
8,675.0	86.69	179.60	8,429.2	-449.9	3.1	450.0	12.00	12.00	0.00
8,700.0	89.69	179.60	8,430.0	-474.9	3.3	474.9	12.00	12.00	0.00
8,704.6	90.24	179.60	8,430.0	-479.5	3.3	479.5	12.00	12.00	0.00
EOC- 8704.6 'MD, 90.24° INC, 179.60° AZI									
8,800.0	90.24	179.60	8,429.6	-574.9	4.0	574.9	0.00	0.00	0.00
8,900.0	90.24	179.60	8,429.2	-674.9	4.7	674.9	0.00	0.00	0.00
9,000.0	90.24	179.60	8,428.8	-774.9	5.4	774.9	0.00	0.00	0.00
9,100.0	90.24	179.60	8,428.3	-874.9	6.1	874.9	0.00	0.00	0.00
9,200.0	90.24	179.60	8,427.9	-974.9	6.8	974.9	0.00	0.00	0.00
9,300.0	90.24	179.60	8,427.5	-1,074.9	7.5	1,074.9	0.00	0.00	0.00
9,400.0	90.24	179.60	8,427.1	-1,174.9	8.2	1,174.9	0.00	0.00	0.00
9,500.0	90.24	179.60	8,426.7	-1,274.9	8.9	1,274.9	0.00	0.00	0.00
9,600.0	90.24	179.60	8,426.2	-1,374.9	9.6	1,374.9	0.00	0.00	0.00
9,700.0	90.24	179.60	8,425.8	-1,474.9	10.3	1,474.9	0.00	0.00	0.00
9,800.0	90.24	179.60	8,425.4	-1,574.9	11.0	1,574.9	0.00	0.00	0.00
9,900.0	90.24	179.60	8,425.0	-1,674.9	11.7	1,674.9	0.00	0.00	0.00
10,000.0	90.24	179.60	8,424.6	-1,774.9	12.4	1,774.9	0.00	0.00	0.00
10,100.0	90.24	179.60	8,424.2	-1,874.9	13.1	1,874.9	0.00	0.00	0.00
10,200.0	90.24	179.60	8,423.7	-1,974.9	13.8	1,974.9	0.00	0.00	0.00
10,300.0	90.24	179.60	8,423.3	-2,074.9	14.5	2,074.9	0.00	0.00	0.00
10,400.0	90.24	179.60	8,422.9	-2,174.9	15.2	2,174.9	0.00	0.00	0.00
10,500.0	90.24	179.60	8,422.5	-2,274.9	15.9	2,274.9	0.00	0.00	0.00
10,600.0	90.24	179.60	8,422.1	-2,374.9	16.6	2,374.9	0.00	0.00	0.00
10,700.0	90.24	179.60	8,421.6	-2,474.9	17.3	2,474.9	0.00	0.00	0.00
10,800.0	90.24	179.60	8,421.2	-2,574.9	18.0	2,574.9	0.00	0.00	0.00
10,900.0	90.24	179.60	8,420.8	-2,674.9	18.7	2,674.9	0.00	0.00	0.00
11,000.0	90.24	179.60	8,420.4	-2,774.9	19.4	2,774.9	0.00	0.00	0.00
11,100.0	90.24	179.60	8,420.0	-2,874.9	20.1	2,874.9	0.00	0.00	0.00
11,200.0	90.24	179.60	8,419.5	-2,974.8	20.8	2,974.9	0.00	0.00	0.00
11,300.0	90.24	179.60	8,419.1	-3,074.8	21.5	3,074.9	0.00	0.00	0.00
11,400.0	90.24	179.60	8,418.7	-3,174.8	22.2	3,174.9	0.00	0.00	0.00
11,500.0	90.24	179.60	8,418.3	-3,274.8	22.9	3,274.9	0.00	0.00	0.00
11,600.0	90.24	179.60	8,417.9	-3,374.8	23.6	3,374.9	0.00	0.00	0.00
11,700.0	90.24	179.60	8,417.5	-3,474.8	24.3	3,474.9	0.00	0.00	0.00
11,800.0	90.24	179.60	8,417.0	-3,574.8	25.0	3,574.9	0.00	0.00	0.00
11,900.0	90.24	179.60	8,416.6	-3,674.8	25.7	3,674.9	0.00	0.00	0.00
12,000.0	90.24	179.60	8,416.2	-3,774.8	26.4	3,774.9	0.00	0.00	0.00
12,100.0	90.24	179.60	8,415.8	-3,874.8	27.1	3,874.9	0.00	0.00	0.00
12,200.0	90.24	179.60	8,415.4	-3,974.8	27.7	3,974.9	0.00	0.00	0.00
12,300.0	90.24	179.60	8,414.9	-4,074.8	28.4	4,074.9	0.00	0.00	0.00
12,400.0	90.24	179.60	8,414.5	-4,174.8	29.1	4,174.9	0.00	0.00	0.00
12,500.0	90.24	179.60	8,414.1	-4,274.8	29.8	4,274.9	0.00	0.00	0.00
12,600.0	90.24	179.60	8,413.7	-4,374.8	30.5	4,374.9	0.00	0.00	0.00
12,700.0	90.24	179.60	8,413.3	-4,474.8	31.2	4,474.9	0.00	0.00	0.00
12,800.0	90.24	179.60	8,412.8	-4,574.8	31.9	4,574.9	0.00	0.00	0.00
12,900.0	90.24	179.60	8,412.4	-4,674.8	32.6	4,674.9	0.00	0.00	0.00
13,000.0	90.24	179.60	8,412.0	-4,774.8	33.3	4,774.9	0.00	0.00	0.00
13,100.0	90.24	179.60	8,411.6	-4,874.8	34.0	4,874.9	0.00	0.00	0.00
13,200.0	90.24	179.60	8,411.2	-4,974.8	34.7	4,974.9	0.00	0.00	0.00
13,300.0	90.24	179.60	8,410.8	-5,074.8	35.4	5,074.9	0.00	0.00	0.00
13,400.0	90.24	179.60	8,410.3	-5,174.8	36.1	5,174.9	0.00	0.00	0.00



Wellplanning Planning Report

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Company:	COG Production LLC	TVD Reference:	WELL @ 3572.9usft (Original Well Elev)
Project:	Lea County, NM	MD Reference:	WELL @ 3572.9usft (Original Well Elev)
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Well:	#2H	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)
13,500.0	90.24	179.60	8,409.9	-5,274.8	36.8	5,274.9	0.00	0.00	0.00
13,600.0	90.24	179.60	8,409.5	-5,374.8	37.5	5,374.9	0.00	0.00	0.00
13,700.0	90.24	179.60	8,409.1	-5,474.8	38.2	5,474.9	0.00	0.00	0.00
13,800.0	90.24	179.60	8,408.7	-5,574.8	38.9	5,574.9	0.00	0.00	0.00
13,900.0	90.24	179.60	8,408.2	-5,674.8	39.6	5,674.9	0.00	0.00	0.00
14,000.0	90.24	179.60	8,407.8	-5,774.8	40.3	5,774.9	0.00	0.00	0.00
14,100.0	90.24	179.60	8,407.4	-5,874.8	41.0	5,874.9	0.00	0.00	0.00
14,200.0	90.24	179.60	8,407.0	-5,974.7	41.7	5,974.9	0.00	0.00	0.00
14,300.0	90.24	179.60	8,406.6	-6,074.7	42.4	6,074.9	0.00	0.00	0.00
14,400.0	90.24	179.60	8,406.1	-6,174.7	43.1	6,174.9	0.00	0.00	0.00
14,500.0	90.24	179.60	8,405.7	-6,274.7	43.8	6,274.9	0.00	0.00	0.00
14,600.0	90.24	179.60	8,405.3	-6,374.7	44.5	6,374.9	0.00	0.00	0.00
14,700.0	90.24	179.60	8,404.9	-6,474.7	45.2	6,474.9	0.00	0.00	0.00
14,800.0	90.24	179.60	8,404.5	-6,574.7	45.9	6,574.9	0.00	0.00	0.00
14,900.0	90.24	179.60	8,404.0	-6,674.7	46.6	6,674.9	0.00	0.00	0.00
15,000.0	90.24	179.60	8,403.6	-6,774.7	47.3	6,774.9	0.00	0.00	0.00
15,100.0	90.24	179.60	8,403.2	-6,874.7	48.0	6,874.9	0.00	0.00	0.00
15,200.0	90.24	179.60	8,402.8	-6,974.7	48.7	6,974.9	0.00	0.00	0.00
15,300.0	90.24	179.60	8,402.4	-7,074.7	49.4	7,074.9	0.00	0.00	0.00
15,400.0	90.24	179.60	8,402.0	-7,174.7	50.1	7,174.9	0.00	0.00	0.00
15,500.0	90.24	179.60	8,401.5	-7,274.7	50.8	7,274.9	0.00	0.00	0.00
15,600.0	90.24	179.60	8,401.1	-7,374.7	51.5	7,374.9	0.00	0.00	0.00
15,700.0	90.24	179.60	8,400.7	-7,474.7	52.2	7,474.9	0.00	0.00	0.00
15,800.0	90.24	179.60	8,400.3	-7,574.7	52.9	7,574.9	0.00	0.00	0.00
15,900.0	90.24	179.60	8,399.9	-7,674.7	53.6	7,674.9	0.00	0.00	0.00
16,000.0	90.24	179.60	8,399.4	-7,774.7	54.3	7,774.9	0.00	0.00	0.00
16,100.0	90.24	179.60	8,399.0	-7,874.7	55.0	7,874.9	0.00	0.00	0.00
16,200.0	90.24	179.60	8,398.6	-7,974.7	55.7	7,974.9	0.00	0.00	0.00
16,300.0	90.24	179.60	8,398.2	-8,074.7	56.4	8,074.9	0.00	0.00	0.00
16,400.0	90.24	179.60	8,397.8	-8,174.7	57.1	8,174.9	0.00	0.00	0.00
16,500.0	90.24	179.60	8,397.3	-8,274.7	57.8	8,274.9	0.00	0.00	0.00
16,600.0	90.24	179.60	8,396.9	-8,374.7	58.5	8,374.9	0.00	0.00	0.00
16,700.0	90.24	179.60	8,396.5	-8,474.7	59.2	8,474.9	0.00	0.00	0.00
16,800.0	90.24	179.60	8,396.1	-8,574.7	59.9	8,574.9	0.00	0.00	0.00
16,900.0	90.24	179.60	8,395.7	-8,674.7	60.6	8,674.9	0.00	0.00	0.00
17,000.0	90.24	179.60	8,395.3	-8,774.7	61.3	8,774.9	0.00	0.00	0.00
17,100.0	90.24	179.60	8,394.8	-8,874.7	62.0	8,874.9	0.00	0.00	0.00
17,200.0	90.24	179.60	8,394.4	-8,974.6	62.7	8,974.9	0.00	0.00	0.00
17,300.0	90.24	179.60	8,394.0	-9,074.6	63.4	9,074.9	0.00	0.00	0.00
17,400.0	90.24	179.60	8,393.6	-9,174.6	64.1	9,174.9	0.00	0.00	0.00
17,500.0	90.24	179.60	8,393.2	-9,274.6	64.8	9,274.9	0.00	0.00	0.00
17,600.0	90.24	179.60	8,392.7	-9,374.6	65.4	9,374.9	0.00	0.00	0.00
17,700.0	90.24	179.60	8,392.3	-9,474.6	66.1	9,474.9	0.00	0.00	0.00
17,800.0	90.24	179.60	8,391.9	-9,574.6	66.8	9,574.9	0.00	0.00	0.00
17,900.0	90.24	179.60	8,391.5	-9,674.6	67.5	9,674.9	0.00	0.00	0.00
18,000.0	90.24	179.60	8,391.1	-9,774.6	68.2	9,774.9	0.00	0.00	0.00
18,100.0	90.24	179.60	8,390.6	-9,874.6	68.9	9,874.9	0.00	0.00	0.00
18,200.0	90.24	179.60	8,390.2	-9,974.6	69.6	9,974.9	0.00	0.00	0.00
18,266.4	90.24	179.60	8,389.9	-10,041.0	70.1	10,041.3	0.00	0.00	0.00
TD at 18266.4 - PBHL(KT#2H)									



Wellplanning Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #2H
Company:	COG Production LLC	TVD Reference:	WELL @ 3572.9usft (Original Well Elev)
Project:	Lea County, NM	MD Reference:	WELL @ 3572.9usft (Original Well Elev)
Site:	King Tut Federal	North Reference:	Grid
Well:	#2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

Design Targets

Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
PBHL(KT#2H)	0.00	0.00	8,390.0	-10,041.1	61.6	425,152.20	690,668.70	32° 10' 2.495 N	103° 43' 1.725 W
- plan misses target center by 8.5usft at 18266.4usft MD (8389.9 TVD, -10041.0 N, 70.1 E)									
- Point									

Plan Annotations

Measured Depth	Vertical Depth	Local Coordinates			
(usft)	(usft)	+N/-S	+E/-W	Comment	
(usft)	(usft)	(usft)	(usft)		
7,952.5	7,952.5	0.0	0.0	KOP - 7952.5 'MD, 0.00° INC, 0.00° AZI	
8,704.6	8,430.0	-479.5	3.3	EOC - 8704.6 'MD, 90.24° INC, 179.60° AZI	
18,266.4	8,389.9	-10,041.0	70.1	TD at 18266.4	



New Mexico Office of the State Engineer

Water Column/Average Depth to Water

(A CLW##### in the
POD suffix indicates the
POD has been replaced
& no longer serves a
water right file.)

(R=POD has
been replaced,
O=orphaned,
C=the file is

closed) (quarters are 1=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest) (NAD83 UTM in meters)

(In feet)

POD Number	POD Sub-Code	basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Depth Well	Depth Water	Water Column
<u>C 01932</u>	C	ED		3	1	12	24S	32E		628633	3567188*	492		
<u>C 02350</u>		ED		4	3	10	24S	32E		625826	3566333*	60		
<u>C 03527 POD1</u>	C	LE		1	2	3	03	24S	32E	625770	3568487	500		
<u>C 03528 POD1</u>	C	LE		1	1	2	15	24S	32E	626040	3566129	541		
<u>C 03530 POD1</u>	C	LE		3	4	3	07	24S	32E	620886	3566156	550		
<u>C 03555 POD1</u>	C	LE		2	2	1	05	24S	32E	622709	3569231	560		

Average Depth to Water: --

Minimum Depth: --

Maximum Depth: --

Record Count: 6

PLSS Search:

Township: 24S

Range: 32E

*UTM location was derived from PLSS - see Help

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.



New Mexico Office of the State Engineer **Water Column/Average Depth to Water**

No records found.

PLSS Search:

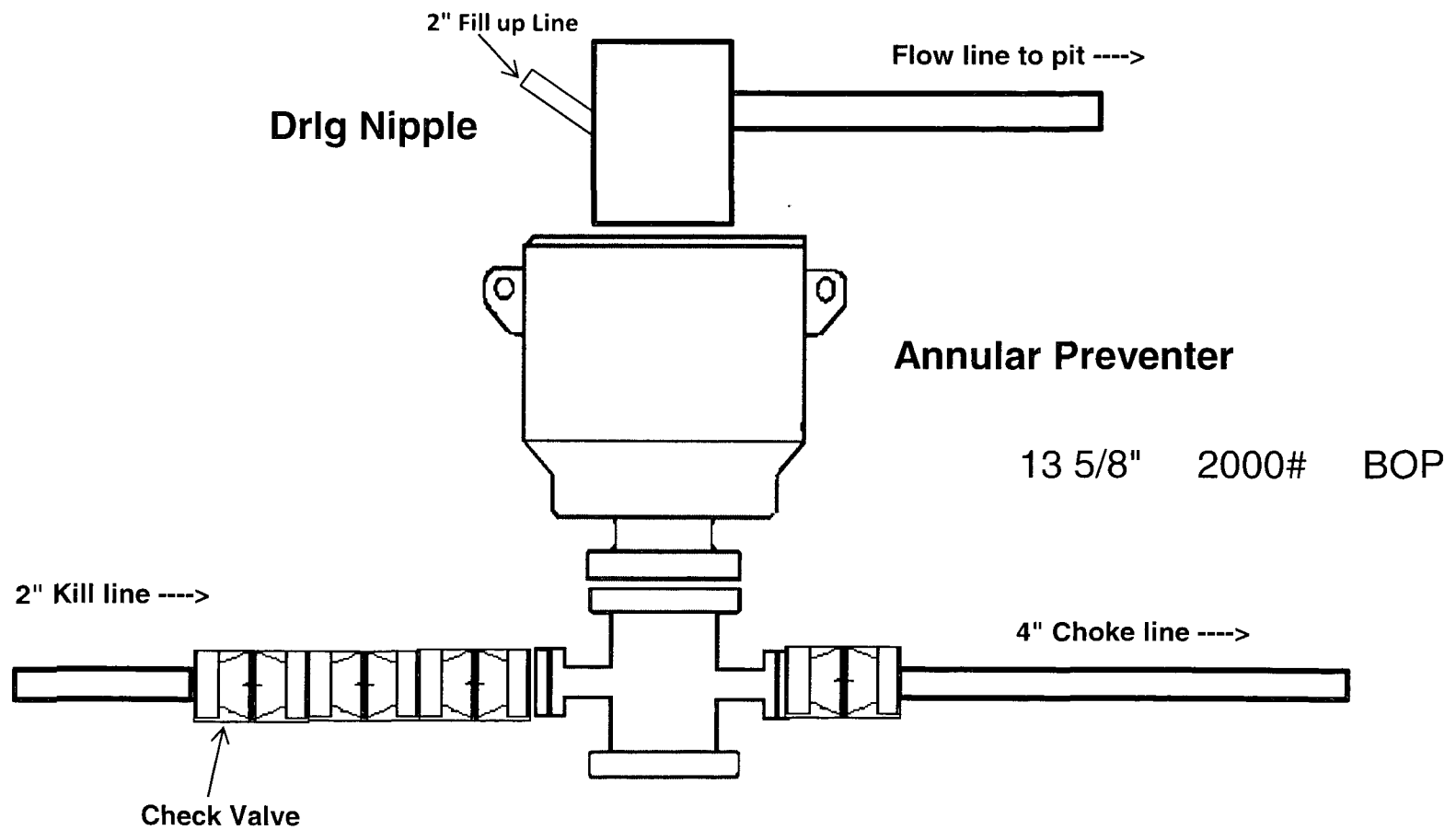
Section(s): 30

Township: 24S

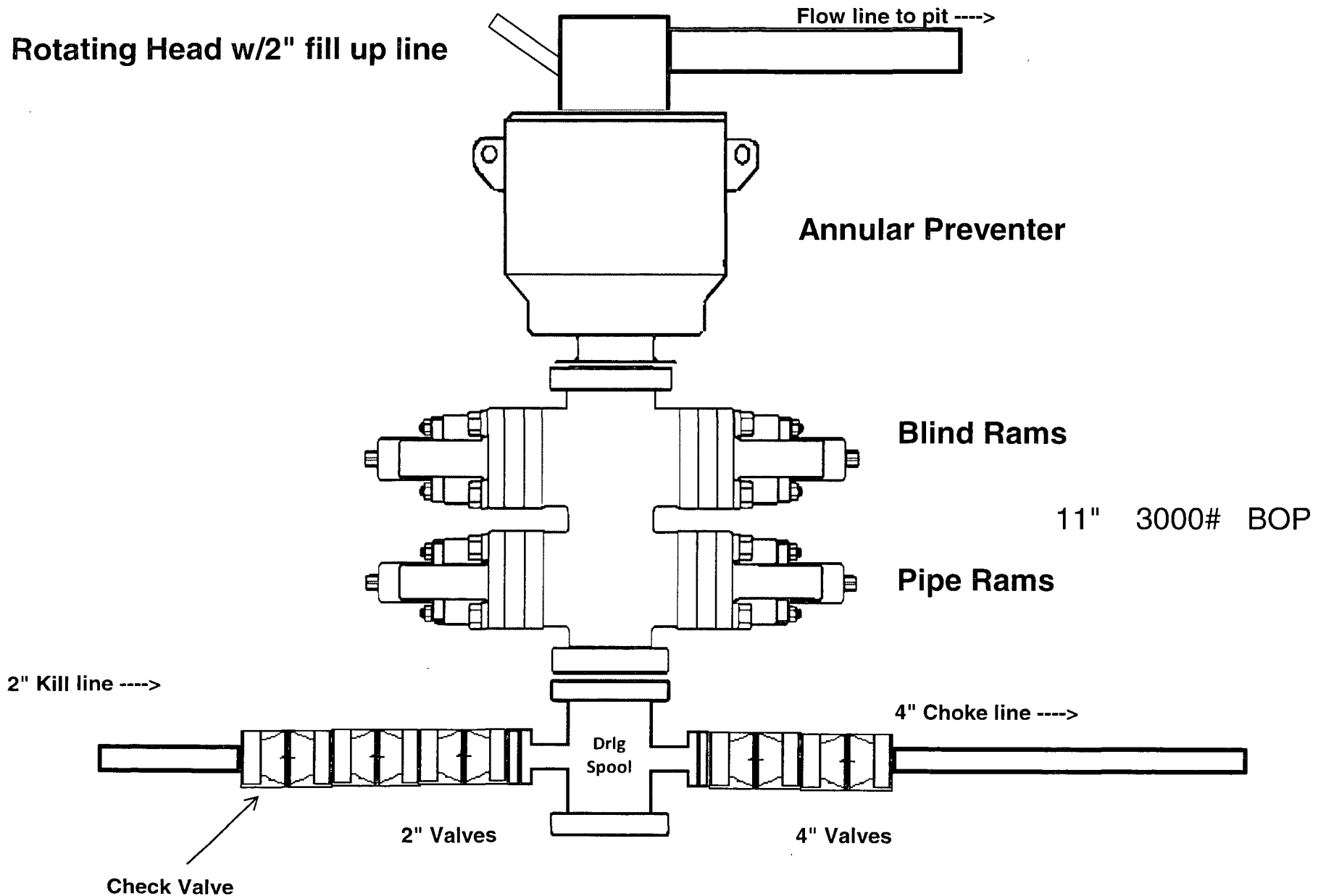
Range: 32E

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

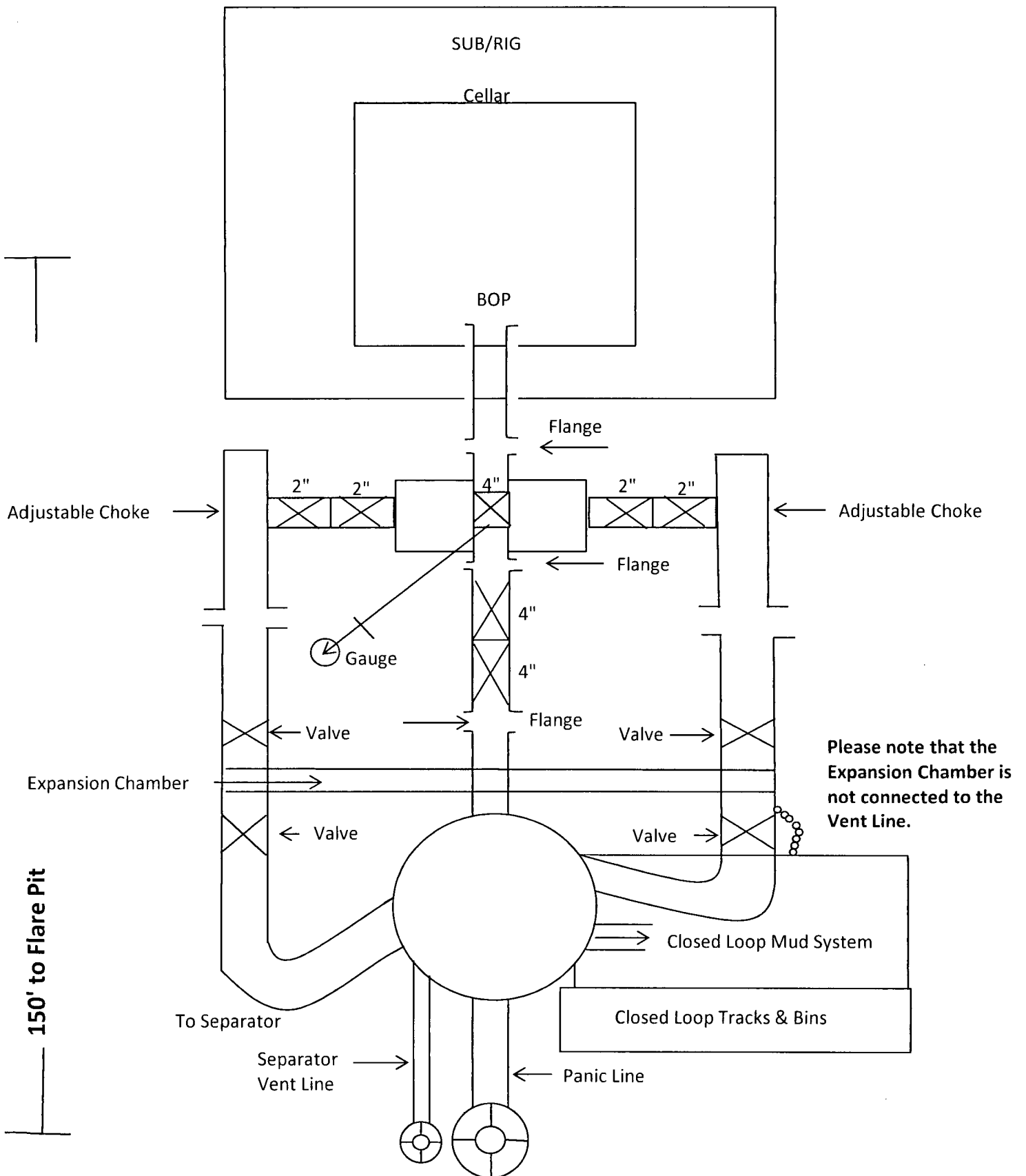
2,000 psi BOP Schematic



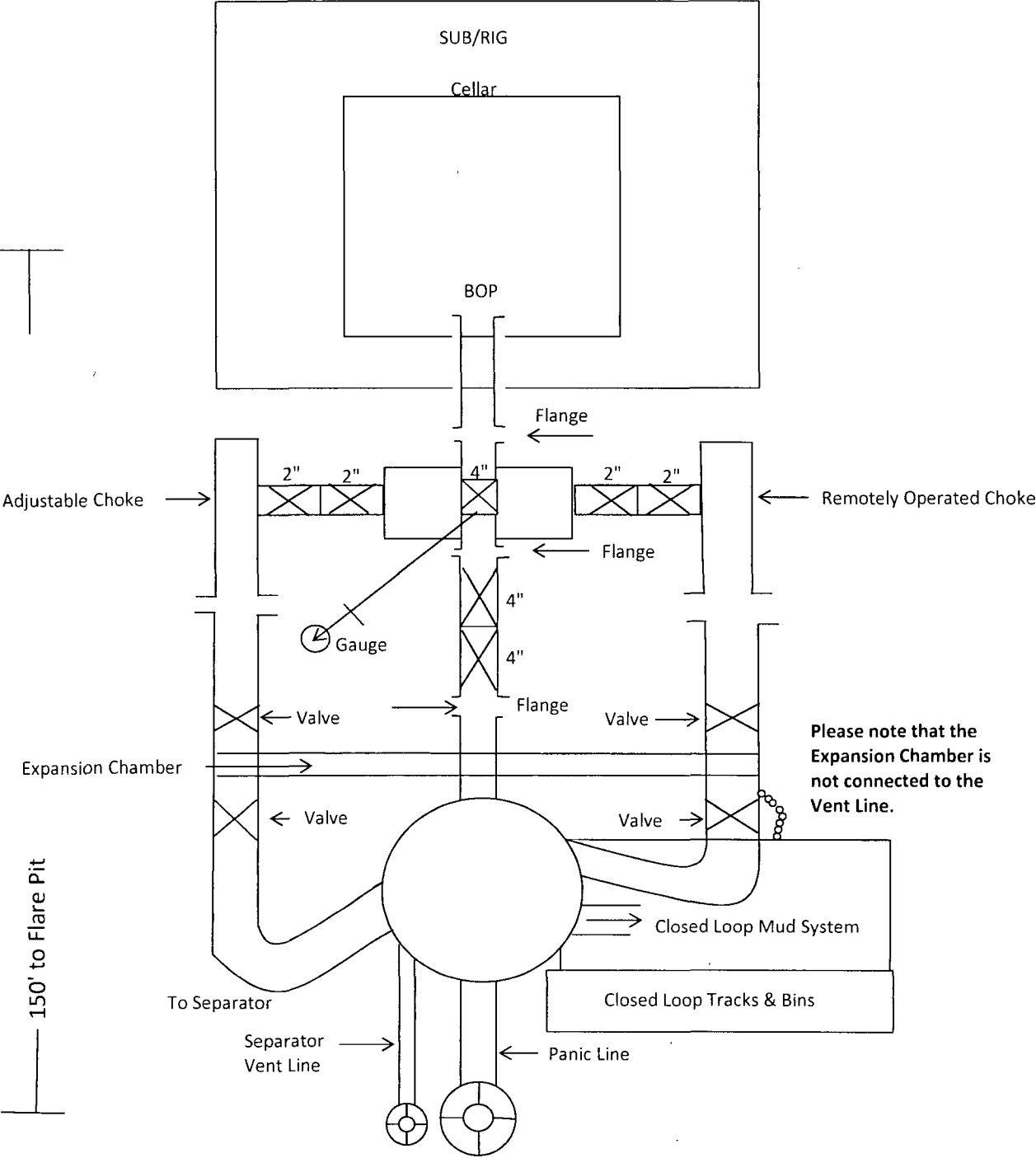
3,000 psi BOP Schematic



2M Choke Manifold Equipment



3M Choke Manifold Equipment



COG Production LLC

Rig Plat & Closed Loop Equipment Diagram

Well pad will be 340' X 340'
with cellar in center of pad

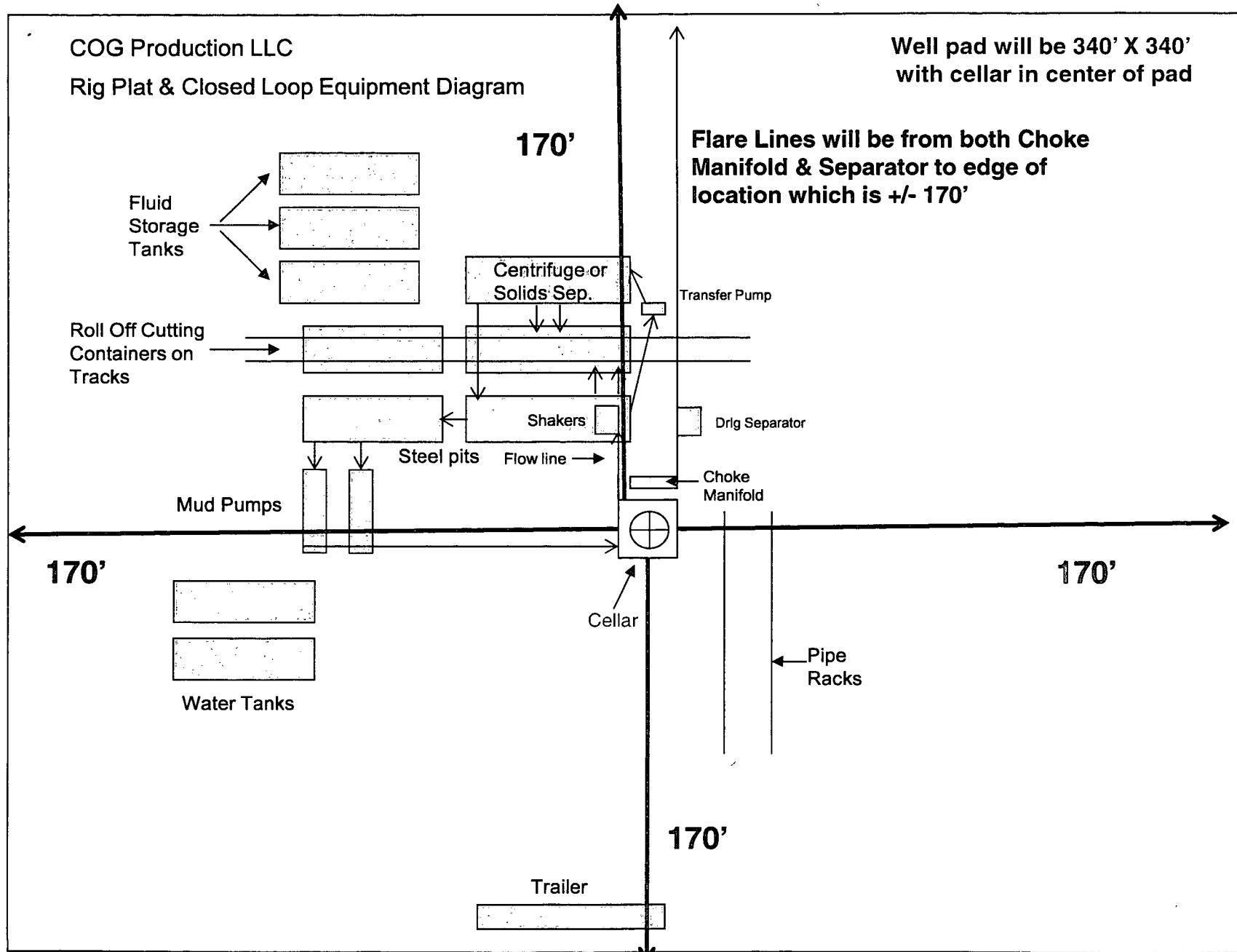


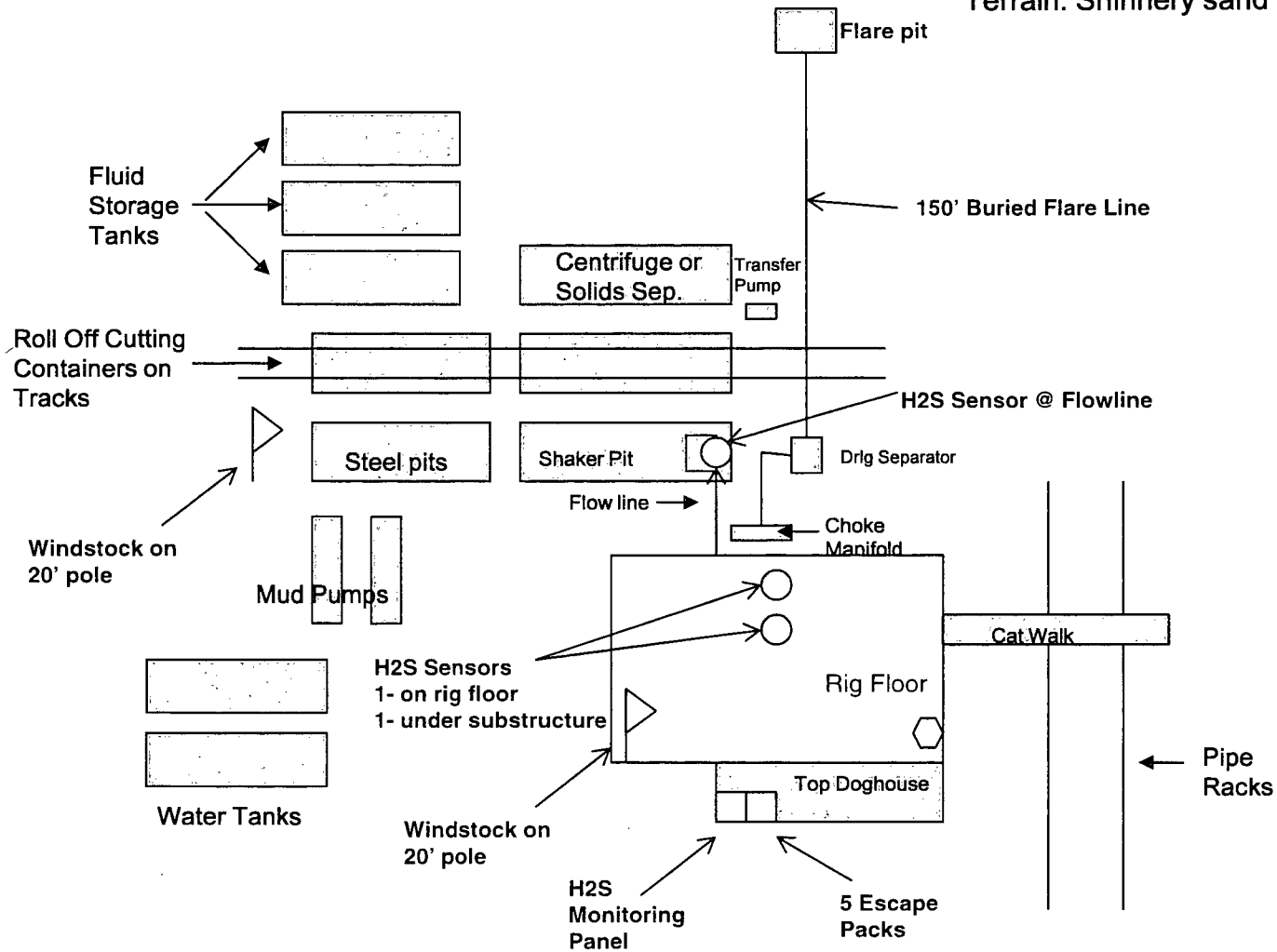
Exhibit 1

"I further certify that COG will comply with Rule 19.15.17
NMAC by using a Closed Loop System."

Well pad will be 340' X 340'
with cellar in center of pad

COG Production LLC
H₂S Equipment Schematic
Terrain: Shinnery sand hills.

Secondary egress.



N
↑

□ Briefing Area
w/SCBA

□ Location Entry
Condition Sign

Company Representative's Trailer

□ Primary Briefing
Area w/SCBA

↗
Prevailing Wind
Direction in SENM