15-948

Form 3160-3
(March 2012)

OCD Hobbs

SECRETARY'S POTASH

R-111-POTASH

HOBBS OCD

NOV 20 2015

RECEIVED

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

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

5. Lease Serial No.: NMLC0029519A

6. If Indian, Allotee or Tribe Name:

1a. Type of Work: [✓] DRILL [ ] REENTER

7. If Unit or CA Agreement, Name and No.:

1b. Type of Well: [✓] Oil Well [ ] Gas Well [ ] Other [✓] Single Zone [ ] Multiple Zone

8. Lease Name and Well No. (315669): Mas Federal #3H

2. Name of Operator: COG Operating LLC. (229137)

9. API Well No.: 30-025-42950

3a. Address: 2208 West Main Street, Artesia, NM 88210

3b. Phone No. *(include area code)*: 575-748-6940

10. Field and Pool, or Exploratory: Berry; Bone Spring, North (5535)

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

At surface: 190' FNL & 2310' FEL Unit Letter B (NWNE) Sec. 34.T20S.R34E SHL

At proposed prod. Zone: 330' FSL & 1980' FEL Unit Letter O (SWSE) Sec 34.T20S.R34E BHL

11. Sec., T.R.M. or Blk and Survey or Area: Sec. 34 - T20S - R34E

14. Distance in miles and direction from nearest town or post office*: About 14 miles from Monument

12. County or Parish: Lea County

13. State: NM

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any)	16. No. of acres in lease	17. Spacing Unit dedicated to this well
190'	520	160
18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft.	**19. Proposed Depth**	**20. BLM/BIA Bond No. on file**
SHL: 130' (Prop. Mas #4H) BHL: 330'	TVD: 15,788' MD: 11,320'	NMB000740 &NMB000215
21. Elevations (Show whether DF, KDB, RT, GL, etc.)	**22. Approximate date work will start***	**23. Estimated duration**
3717.2' GL	9/1/2015	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.
2. A Drilling Plan
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).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification
6. Such other site specific information and/or plans as may be required by the authorized officer.

25. Signature	Name *(Printed/Typed)*	Date
Mayte Reyes	Mayte Reyes	8-4-2015

Title: Regulatory Analyst

Approved by *(Signature)*	Name *(Printed/Typed)*	Date
/S/ JEANETTE MARTINEZ		11/19/15
Title	**Office**	
FIELD MANAGER	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 theron.

Conditions of approval, if any, are attached.

APPROVAL FOR TWO YEARS

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Continued on page 2)

*(Instructions on page 2)

Capitan Controlled Water Basin

KZ 11/20/15

NOV 23 2015

Approval Subject to General Requirements & Special Stipulations Attached

SEE ATTACHED FOR CONDITIONS OF APPROVAL

COG Operating LLC, Mas Federal #3H

1. Geologic Formations

TVD of target	11320'	Pilot hole depth	NA
MD at TD:	15788'	Deepest expected fresh water:	64'

Basin

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	1652'	Water	
Top of Salt	1735'	Salt	
Yates	3522'		
Delaware Group	3753'	Oil/Gas	Possible lost circ
Bone Spring	8614'	Oil/Gas	
3rd Bone Spring Sand	11098'	Target Zone	
Wolfcamp	11369'	Oil/Gas	

2. Casing Program

See COA

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
17.5"	0'	1680'	13.375"	54.5	J55	STC	1.47	1.01	5.61
12.25"	0'	3800'	9.625"	36	J55	LTC	1.14	1.98	3.57
12.25"	3800'	5780	9.625"	40	L80	LTC	1.14	2.13	2.0
8.75"	0'	15788'	5-1/2"	17	P110	LTC	1.41	2.01	1.66
				BLM Minimum Safety Factor			1.125	1.00	1.6 Dry 1.8 Wet

- All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h
- BLM standard formulas where used on all SF calculations.
- Used 9 PPG for pore pressure calculations

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Does casing meet API specifications? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	N
Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	Y
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

✳ **3. Cementing Program** See COA

Casing	# Sks	Wt. lb/ gal	Yld ft3/ sack	H_20 gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	900	13.5	1.7	9.4	10-13	Lead: 4% gel w/ 2% CaCl2
	250	14.8	1.34	6.4	7	Tail: Class C + 2% CaCl2
Inter	365	13.5	1.7	9.4	10	Lead: Class C + 4% Gel + 1% CaCl2
	200	14.8	1.34	6.6	5	Tail: Class C + 1% CaCl2
	DV tool at 3653'					
	1250	12.7	2	9.4	5	Lead: Class C +4% gel, up to 2% CaCl2
	200	14.8	1.34	6.6	5	Tail: Class C + 1% CaCl2
Prod.	1150	10.4	3.48	14.3	60	Lead: HES Econochem H. 50:50 poz w/ 10% gel, 8lbm salt, 5 lbm kol-seal, 0.5% Halad -322, 0.25 lbm D-air 500
	1225	14.40	1.25	5.7	20	Tail:50:50:2 H blend (FR, Retarder, FL adds as necessary)

Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Casing String	TOC	% Excess
Surface	0'	47%
Intermediate	0'	218%
Production	~~3153'~~ 0'	109%

Pilot hole depth: NA
KOP: 10742'

4. Pressure Control Equipment ✳ See COA

BOP installed and tested before drilling which hole?	Size	Min. Required WP	Type	✓	Tested to:
12-1/4"	13-5/8''	2M	Annular	x	50% of working pressure
			Blind Ram		2M
			Pipe Ram		
			Double Ram		
			Other*		
8-3/4"	11"	3M	Annular	x	50% testing pressure
			Blind Ram		3M
			Pipe Ram		
			Double Ram	x	
			Other *		

* Actual equipment is 13-5/8" 5M Hydril Annular, will use for 2M WP System.

** - Actual equipment is 13-5/8" 5M Shaeffer Annular & 13-5/8" 5M Cameron double ram, will use for 3M WP System.

✳ See COA

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

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. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

Y	Formation integrity test will be performed per Onshore Order #2.

	On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.
N	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.
	Are anchors required by manufacturer? No.
N	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested. See attached schematic.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. shoe	FW Gel	8.6 – 9.0	28-34	N/C
Surf csg	Int shoe	Saturated Brine	10.0 - 10.2	28-34	N/C
Int shoe	TMD	Cut Brine	8.6 - 9.3	28-34	N/C

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

What will be used to monitor the loss or gain of fluid?	Pason PVT

6. Logging and Testing Procedures

See COA

Logging, Coring and Testing.	
X	Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
	No Logs are planned based on well control or offset log information.
	Drill stem test? If yes, explain
	Coring? If yes, explain

Additional logs planned		Interval

7. Drilling Conditions * See COA

Condition	Specify what type and where?
BH Pressure at deepest TVD	5221 psi – 3rd Bone Spring Sand (11320' TVD)
Abnormal Temperature	No

Mitigation measure for abnormal conditions.

- Lost circulation material/sweeps/mud scavengers.
- Maintain stock of LCM and weighting materials onsite.

Hydrogen Sulfide (H2S) monitors will be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM.	
Y	H2S is present
N	H2S Plan attached

8. Other facets of operation

Is this a walking operation? No.
Will be pre-setting casing? No.

Attachments

- Directional Plan
- BOP & Choke Schematics
- C102 and supporting maps
- Rig plat
- H2S schematic
- H2S contingency plan
- Interim reclamation plat

CONCHO

COG Operating LLC

Lea County, NM (NAD27 NME)
Mas Fed
#3H

OH

Plan: Design #1

Standard Planning Report

30 July, 2015

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well #3H
Company:	COG Operating LLC	**TVD Reference:**	WELL @ 3734.2usft (Original Well Elev)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	WELL @ 3734.2usft (Original Well Elev)
Site:	Mas Fed	**North Reference:**	Grid
Well:	#3H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

Project	Lea County, NM (NAD27 NME)		
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	Mas Fed				
Site Position:		**Northing:**	559,699.50 usft	**Latitude:**	32° 32' 10.321 N
From:	Map	**Easting:**	745,455.60 usft	**Longitude:**	103° 32' 12.727 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.43 °

Well	#3H					
Well Position	**+N/-S**	-22.1 usft	**Northing:**	559,677.40 usft	**Latitude:**	32° 32' 10.320 N
	+E/-W	-2,970.0 usft	**Easting:**	742,485.60 usft	**Longitude:**	103° 32' 47.420 W
Position Uncertainty		0.0 usft	**Wellhead Elevation:**		**Ground Level:**	3,717.2 usft

Wellbore	OH			
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2010	7/22/2015	7.09	60.38	48,394

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)**	**Direction (°)**	
	0.0	0.0	0.0	175.63	

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	
10,742.5	0.00	0.00	10,742.5	0.0	0.0	0.00	0.00	0.00	0.00	
11,481.7	88.67	175.63	11,220.0	-465.2	35.5	12.00	12.00	0.00	175.63	
15,787.9	88.67	175.63	11,320.0	-4,757.7	363.6	0.00	0.00	0.00	0.00	PBHL(MasF#3H)

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Site:	Mas Fed	**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)
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

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well #3H
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Site:	Mas Fed	**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)
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
8,614.0	0.00	0.00	8,614.0	0.0	0.0	0.0	0.00	0.00	0.00
BGSL									
8,689.0	0.00	0.00	8,689.0	0.0	0.0	0.0	0.00	0.00	0.00
U Avalon SH									
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
9,056.0	0.00	0.00	9,056.0	0.0	0.0	0.0	0.00	0.00	0.00
L Avalon SH									
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
9,714.0	0.00	0.00	9,714.0	0.0	0.0	0.0	0.00	0.00	0.00
FBSG									
9,800.0	0.00	0.00	9,800.0	0.0	0.0	0.0	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well #3H
Company:	COG Operating LLC	**TVD Reference:**	WELL @ 3734.2usft (Original Well Elev)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	WELL @ 3734.2usft (Original Well Elev)
Site:	Mas Fed	**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)
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
10,292.0	0.00	0.00	10,292.0	0.0	0.0	0.0	0.00	0.00	0.00
SBSG									
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
10,600.0	0.00	0.00	10,600.0	0.0	0.0	0.0	0.00	0.00	0.00
10,700.0	0.00	0.00	10,700.0	0.0	0.0	0.0	0.00	0.00	0.00
10,742.5	0.00	0.00	10,742.5	0.0	0.0	0.0	0.00	0.00	0.00
KOP - 10742.5 'MD, 0.00° INC, 0.00° AZI									
10,750.0	0.90	175.63	10,750.0	-0.1	0.0	0.1	12.00	12.00	0.00
10,775.0	3.90	175.63	10,775.0	-1.1	0.1	1.1	12.00	12.00	0.00
10,800.0	6.90	175.63	10,799.9	-3.4	0.3	3.5	12.00	12.00	0.00
10,825.0	9.90	175.63	10,824.6	-7.1	0.5	7.1	12.00	12.00	0.00
10,850.0	12.90	175.63	10,849.1	-12.0	0.9	12.0	12.00	12.00	0.00
10,875.0	15.89	175.63	10,873.3	-18.2	1.4	18.3	12.00	12.00	0.00
10,900.0	18.89	175.63	10,897.2	-25.7	2.0	25.7	12.00	12.00	0.00
10,925.0	21.89	175.63	10,920.6	-34.3	2.6	34.4	12.00	12.00	0.00
10,950.0	24.89	175.63	10,943.5	-44.2	3.4	44.4	12.00	12.00	0.00
10,975.0	27.89	175.63	10,965.9	-55.3	4.2	55.5	12.00	12.00	0.00
11,000.0	30.89	175.63	10,987.7	-67.5	5.2	67.7	12.00	12.00	0.00
11,025.0	33.89	175.63	11,008.8	-80.9	6.2	81.1	12.00	12.00	0.00
11,050.0	36.89	175.63	11,029.2	-95.3	7.3	95.6	12.00	12.00	0.00
11,075.0	39.89	175.63	11,048.8	-110.8	8.5	111.1	12.00	12.00	0.00
11,100.0	42.89	175.63	11,067.5	-127.3	9.7	127.7	12.00	12.00	0.00
11,125.0	45.88	175.63	11,085.4	-144.7	11.1	145.1	12.00	12.00	0.00
11,143.5	48.10	175.63	11,098.0	-158.2	12.1	158.6	12.00	12.00	0.00
TBSG									
11,150.0	48.88	175.63	11,102.3	-163.1	12.5	163.5	12.00	12.00	0.00
11,175.0	51.88	175.63	11,118.3	-182.3	13.9	182.8	12.00	12.00	0.00
11,200.0	54.88	175.63	11,133.2	-202.3	15.5	202.9	12.00	12.00	0.00
11,225.0	57.88	175.63	11,147.0	-223.0	17.0	223.7	12.00	12.00	0.00
11,250.0	60.88	175.63	11,159.8	-244.5	18.7	245.2	12.00	12.00	0.00
11,275.0	63.88	175.63	11,171.3	-266.6	20.4	267.3	12.00	12.00	0.00
11,300.0	66.88	175.63	11,181.8	-289.2	22.1	290.1	12.00	12.00	0.00
11,325.0	69.88	175.63	11,191.0	-312.4	23.9	313.3	12.00	12.00	0.00
11,350.0	72.87	175.63	11,199.0	-336.0	25.7	337.0	12.00	12.00	0.00
11,375.0	75.87	175.63	11,205.7	-360.0	27.5	361.1	12.00	12.00	0.00
11,400.0	78.87	175.63	11,211.1	-384.3	29.4	385.5	12.00	12.00	0.00
11,425.0	81.87	175.63	11,215.3	-408.9	31.2	410.1	12.00	12.00	0.00
11,450.0	84.87	175.63	11,218.2	-433.7	33.1	434.9	12.00	12.00	0.00
11,475.0	87.87	175.63	11,219.8	-458.5	35.0	459.9	12.00	12.00	0.00
11,481.7	88.67	175.63	11,220.0	-465.2	35.5	466.5	12.00	12.00	0.00
EOC- 11481.7 'MD, 88.67° INC, 175.63° AZI									
11,500.0	88.67	175.63	11,220.4	-483.5	36.9	484.9	0.00	0.00	0.00
11,600.0	88.67	175.63	11,222.7	-583.1	44.6	584.8	0.00	0.00	0.00
11,700.0	88.67	175.63	11,225.1	-682.8	52.2	684.8	0.00	0.00	0.00
11,800.0	88.67	175.63	11,227.4	-782.5	59.8	784.8	0.00	0.00	0.00
11,900.0	88.67	175.63	11,229.7	-882.2	67.4	884.8	0.00	0.00	0.00
12,000.0	88.67	175.63	11,232.0	-981.9	75.0	984.7	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well #3H
Company:	COG Operating LLC	**TVD Reference:**	WELL @ 3734.2usft (Original Well Elev)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	WELL @ 3734.2usft (Original Well Elev)
Site:	Mas Fed	**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)
12,100.0	88.67	175.63	11,234.4	-1,081.6	82.7	1,084.7	0.00	0.00	0.00
12,200.0	88.67	175.63	11,236.7	-1,181.2	90.3	1,184.7	0.00	0.00	0.00
12,300.0	88.67	175.63	11,239.0	-1,280.9	97.9	1,284.7	0.00	0.00	0.00
12,400.0	88.67	175.63	11,241.3	-1,380.6	105.5	1,384.6	0.00	0.00	0.00
12,500.0	88.67	175.63	11,243.6	-1,480.3	113.1	1,484.6	0.00	0.00	0.00
12,600.0	88.67	175.63	11,246.0	-1,580.0	120.7	1,584.6	0.00	0.00	0.00
12,700.0	88.67	175.63	11,248.3	-1,679.6	128.4	1,684.5	0.00	0.00	0.00
12,800.0	88.67	175.63	11,250.6	-1,779.3	136.0	1,784.5	0.00	0.00	0.00
12,900.0	88.67	175.63	11,252.9	-1,879.0	143.6	1,884.5	0.00	0.00	0.00
13,000.0	88.67	175.63	11,255.2	-1,978.7	151.2	1,984.5	0.00	0.00	0.00
13,100.0	88.67	175.63	11,257.6	-2,078.4	158.8	2,084.4	0.00	0.00	0.00
13,200.0	88.67	175.63	11,259.9	-2,178.1	166.4	2,184.4	0.00	0.00	0.00
13,300.0	88.67	175.63	11,262.2	-2,277.7	174.1	2,284.4	0.00	0.00	0.00
13,400.0	88.67	175.63	11,264.5	-2,377.4	181.7	2,384.4	0.00	0.00	0.00
13,500.0	88.67	175.63	11,266.8	-2,477.1	189.3	2,484.3	0.00	0.00	0.00
13,600.0	88.67	175.63	11,269.2	-2,576.8	196.9	2,584.3	0.00	0.00	0.00
13,700.0	88.67	175.63	11,271.5	-2,676.5	204.5	2,684.3	0.00	0.00	0.00
13,800.0	88.67	175.63	11,273.8	-2,776.2	212.2	2,784.2	0.00	0.00	0.00
13,900.0	88.67	175.63	11,276.1	-2,875.8	219.8	2,884.2	0.00	0.00	0.00
14,000.0	88.67	175.63	11,278.5	-2,975.5	227.4	2,984.2	0.00	0.00	0.00
14,100.0	88.67	175.63	11,280.8	-3,075.2	235.0	3,084.2	0.00	0.00	0.00
14,200.0	88.67	175.63	11,283.1	-3,174.9	242.6	3,184.1	0.00	0.00	0.00
14,300.0	88.67	175.63	11,285.4	-3,274.6	250.2	3,284.1	0.00	0.00	0.00
14,400.0	88.67	175.63	11,287.7	-3,374.2	257.9	3,384.1	0.00	0.00	0.00
14,500.0	88.67	175.63	11,290.1	-3,473.9	265.5	3,484.1	0.00	0.00	0.00
14,600.0	88.67	175.63	11,292.4	-3,573.6	273.1	3,584.0	0.00	0.00	0.00
14,700.0	88.67	175.63	11,294.7	-3,673.3	280.7	3,684.0	0.00	0.00	0.00
14,800.0	88.67	175.63	11,297.0	-3,773.0	288.3	3,784.0	0.00	0.00	0.00
14,900.0	88.67	175.63	11,299.3	-3,872.7	295.9	3,884.0	0.00	0.00	0.00
15,000.0	88.67	175.63	11,301.7	-3,972.3	303.6	3,983.9	0.00	0.00	0.00
15,100.0	88.67	175.63	11,304.0	-4,072.0	311.2	4,083.9	0.00	0.00	0.00
15,200.0	88.67	175.63	11,306.3	-4,171.7	318.8	4,183.9	0.00	0.00	0.00
15,300.0	88.67	175.63	11,308.6	-4,271.4	326.4	4,283.8	0.00	0.00	0.00
15,400.0	88.67	175.63	11,310.9	-4,371.1	334.0	4,383.8	0.00	0.00	0.00
15,500.0	88.67	175.63	11,313.3	-4,470.8	341.7	4,483.8	0.00	0.00	0.00
15,600.0	88.67	175.63	11,315.6	-4,570.4	349.3	4,583.8	0.00	0.00	0.00
15,700.0	88.67	175.63	11,317.9	-4,670.1	356.9	4,683.7	0.00	0.00	0.00
15,787.9	88.67	175.63	11,320.0	-4,757.7	363.6	4,771.6	0.00	0.00	0.00

TD at 15787.9 - PBHL(MasF#3H)

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL(MasF#3H)	0.00	0.00	11,320.0	-4,758.0	360.3	554,919.40	742,845.90	32° 31' 23.214 N	103° 32' 43.622 W
- plan misses target center by 3.3usft at 15787.9usft MD (11320.0 TVD, -4757.7 N, 363.6 E)									
- Point									

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well #3H
Company:	COG Operating LLC	**TVD Reference:**	WELL @ 3734.2usft (Original Well Elev)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	WELL @ 3734.2usft (Original Well Elev)
Site:	Mas Fed	**North Reference:**	Grid
Well:	#3H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
8,614.0	8,614.0	BGSL		0.00	
8,689.0	8,689.0	U Avalon SH		0.00	
9,056.0	9,056.0	L Avalon SH		0.00	
9,714.0	9,714.0	FBSG		0.00	
10,292.0	10,292.0	SBSG		0.00	
11,143.5	11,098.0	TBSG		0.00	

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
10,742.5	10,742.5	0.0	0.0	KOP - 10742.5 'MD, 0.00° INC, 0.00° AZI
11,481.7	11,220.0	-465.2	35.5	EOC- 11481.7 'MD, 88.67° INC, 175.63° AZI
15,787.9	11,320.0	-4,757.7	363.6	TD at 15787.9

Company: COG Operating LLC
Field: Lea County, NM (NAD27 NME)
Location: Mas Fed
Well: #3H
OH
Plan: Design #1 (#3H/OH)
WELL @ 3734.2usft (Original Well Elev)
Ground Level: 3717.2

CONCHO

WELL DETAILS: #3H

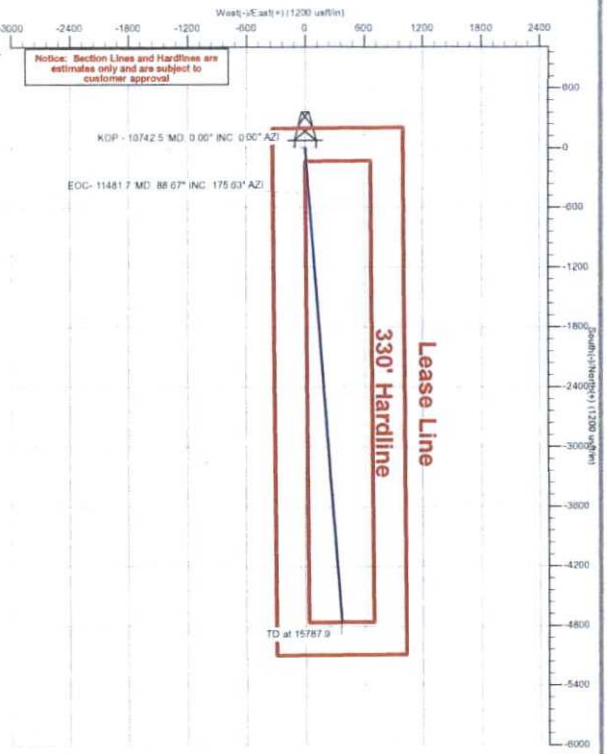
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	559677.40	742485.60	32° 32' 10.320 N	103° 32' 47.420 W	

Ground Level: 3717.2
WELL @ 3734.2usft (Original Well Elev)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	10742.5	0.00	0.00	10742.5	0.0	0.0	0.00	0.00	0.0	KOP - 10742.5 MD, 0.00° INC, 0.00° AZI
3	11481.7	88.67	175.63	11220.0	-465.2	36.5	12.00	175.63	466.5	EOC- 11481.7 MD, 88.67° INC, 175.63° AZI
4	15787.9	88.67	175.63	11320.0	-4757.7	383.6	0.00	0.00	4771.6	TD at 15787.9

Notice: Section Lines and Hardlines are estimates only and are subject to customer approval



PROJECT DETAILS: Lea County, NM (NAD27 NME)

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

Azimuths to Grid North
True North: -0.42°
Magnetic North: 6.67°

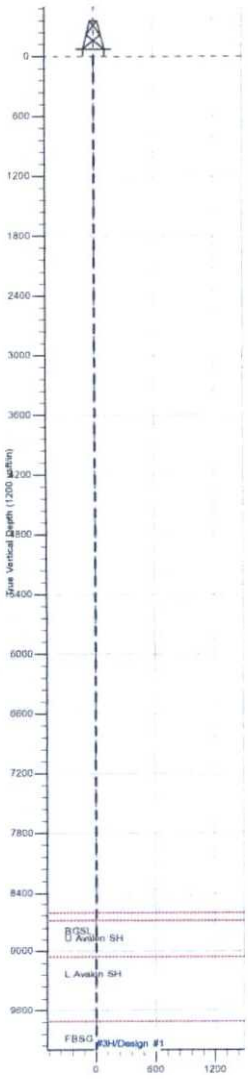
Magnetic Field
Strength: 48393.5nT
Dip Angle: 60.38°
Date: 7/22/2015
Model: IGRF2010

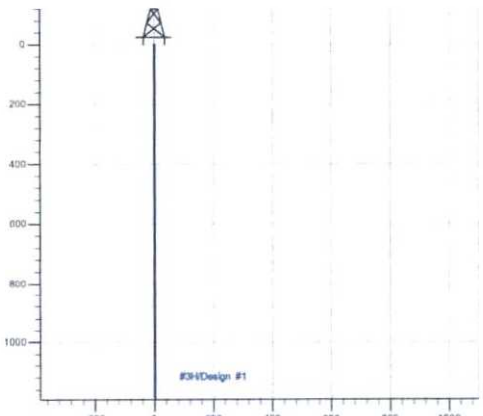
FORMATION TOP DETAILS

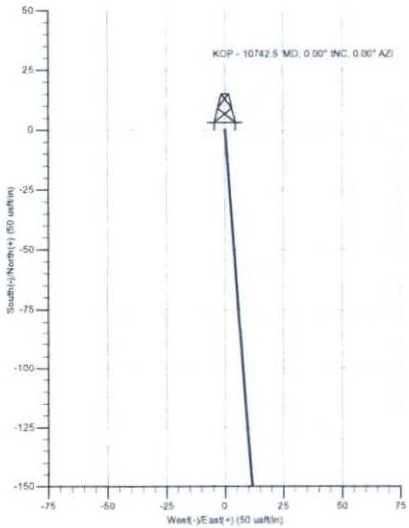
TVDPath	MDPath	Formation
8614.0	8614.0	BGSL
8689.0	8689.0	U Avalon SH
9056.0	9056.0	L Avalon SH
9714.0	9714.0	FBSG
10292.0	10292.0	SBSG
11098.0	11143.5	TBSG

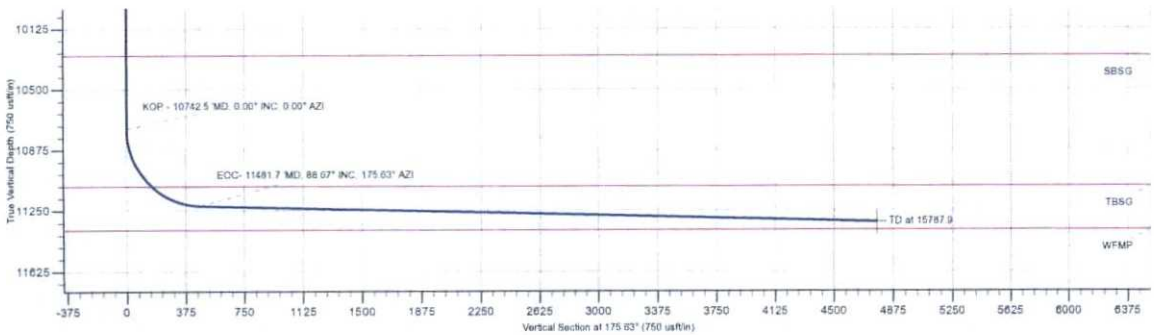
ANNOTATIONS

TVD	MD	Annotation
10742.5	10742.5	KOP - 10742.5 MD, 0.00° INC, 0.00° AZI
11220.0	11481.7	EOC- 11481.7 MD, 88.67° INC, 175.63° AZI
11320.0	15787.9	TD at 15787.9









DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
PBHL(Mas F#3H)	11320.0	-4758.0	300.3	554919.40	742845.90	32° 31' 23.214 N	103° 32' 43.022 W	Point

NEXUS DIRECTIONAL SOLUTIONS, L.P.

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-basin Code	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Depth Well	Depth Water	Water Column
CP 00799		LE	4	3	4	34	20S	34E	636666	3599364*	100		
CP 01288 POD1		LE	4	4	2	34	20S	34E	637134	3600204	1255	757	498
CP 01289 POD1		LE	4	4	2	34	20S	34E	637037	3600261	1222	651	571
CP 01330 POD1		LE	3	2	1	34	20S	34E	636197	3600483	1349	683	666
CP 01352 POD1		LE	3	1	4	34	20S	34E	636559	3599716	1254	785	469

Average Depth to Water: **719 feet**

Minimum Depth: **651 feet**

Maximum Depth: **785 feet**

Record Count: 5

PLSS Search:

Section(s): 34 **Township:** 20S **Range:** 34E

***UTM location was derived from PLSS - see Help**

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-basin Code	County	Q 64	Q 16	Q 4	Sec	Twn	Rng	X	Y	Depth Well	Depth Water	Water Column
CP 00654		LE		4	4	12	20S	34E	640103	3605947*	60		
CP 00655		LE		3	1	14	20S	34E	637294	3605108*	210		
CP 00656		LE	4	4	4	04	20S	34E	635342	3607391*	225		
CP 00657		LE		3	3	17	20S	34E	632465	3604239*	165		
CP 00665		LE		1	4	24	20S	34E	639740	3603128*	698	270	428
CP 00750		LE		3	4	07	20S	34E	631639	3605834*	320		
CP 00799		LE	4	3	4	34	20S	34E	636666	3599364*	100		
CP 00800		LE	2	2	2	22	20S	34E	637007	3603994*	220		
CP 01204 POD1		LE	3	1	1	25	20S	34E	638755	3602250	370		
CP 01288 POD1		LE	4	4	2	34	20S	34E	637134	3600204	1255	757	498
CP 01289 POD1		LE	4	4	2	34	20S	34E	637037	3600261	1222	651	571
CP 01330 POD1		LE	3	2	1	34	20S	34E	636197	3600483	1349	683	666
CP 01334 POD1		LE	3	2	4	35	20S	34E	638402	3599879	1253	732	521
CP 01335 POD1		LE	4	1	4	35	20S	34E	638205	3599736	1307	735	572
CP 01352 POD1		LE	3	1	4	34	20S	34E	636559	3599716	1254	785	469

Average Depth to Water: **659 feet**
Minimum Depth: **270 feet**
Maximum Depth: **785 feet**

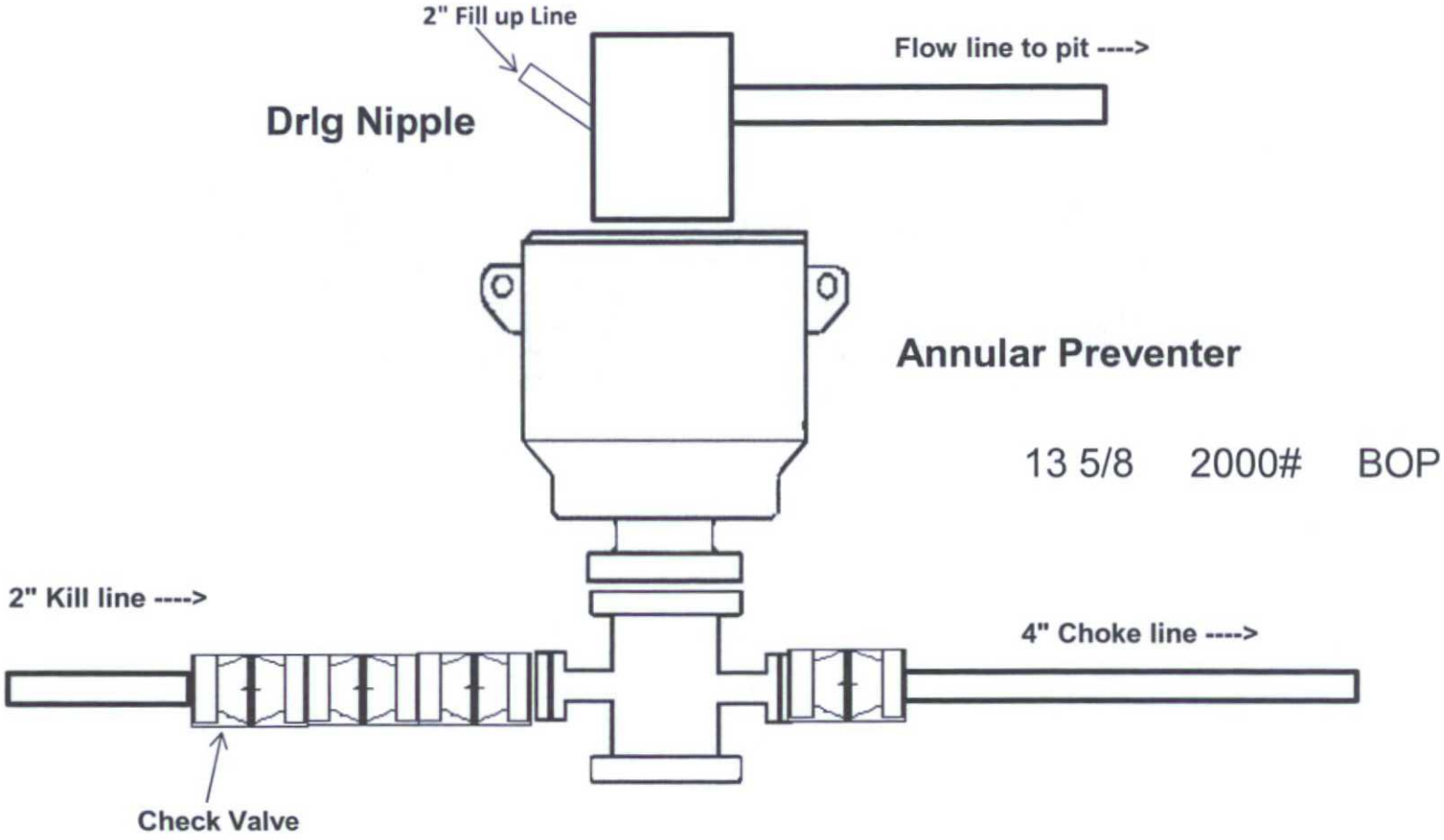
Record Count: 15

PLSS Search:

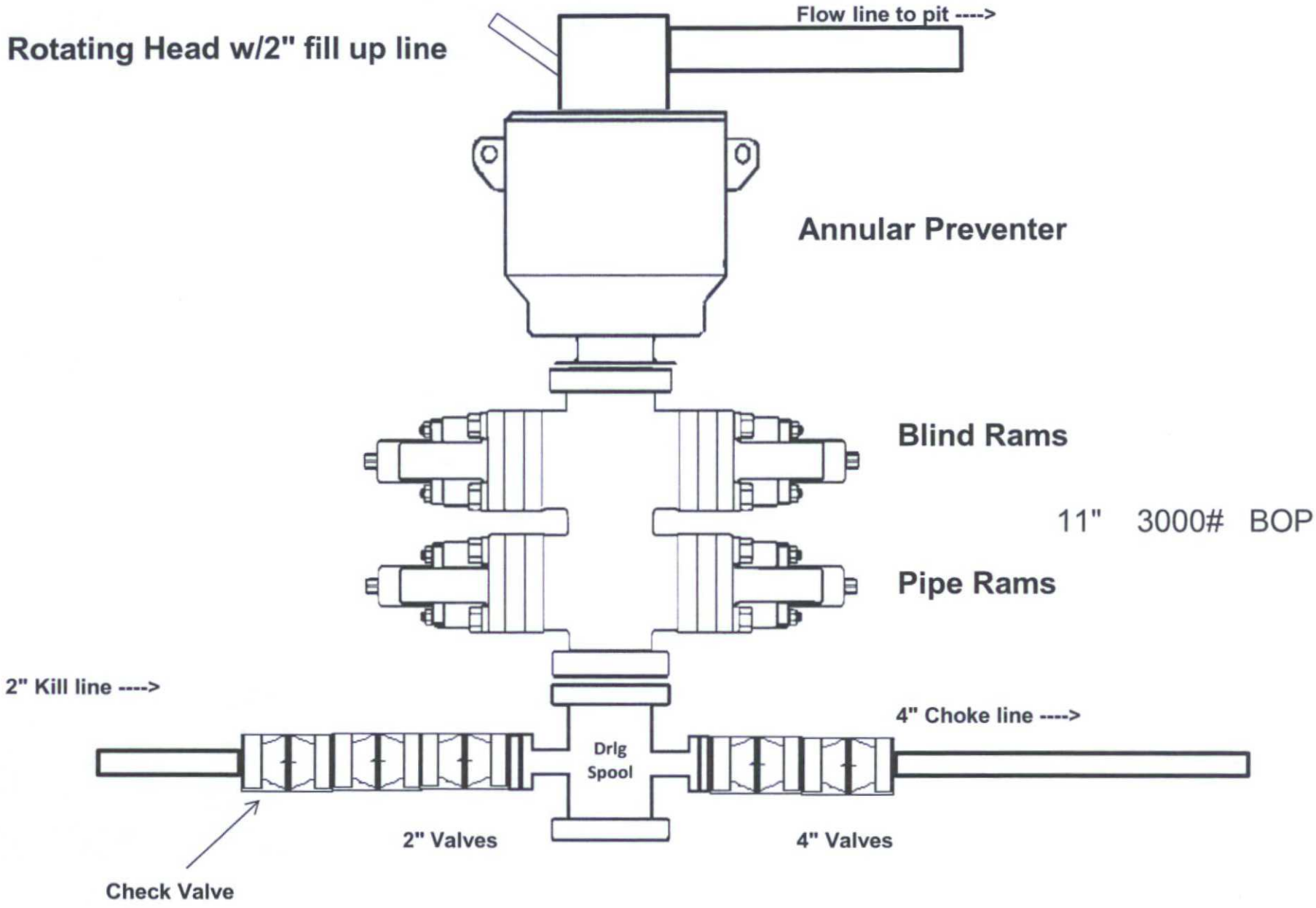
Township: 20S **Range:** 34E

***UTM location was derived from PLSS - see Help**

2,000 psi BOP Schematic

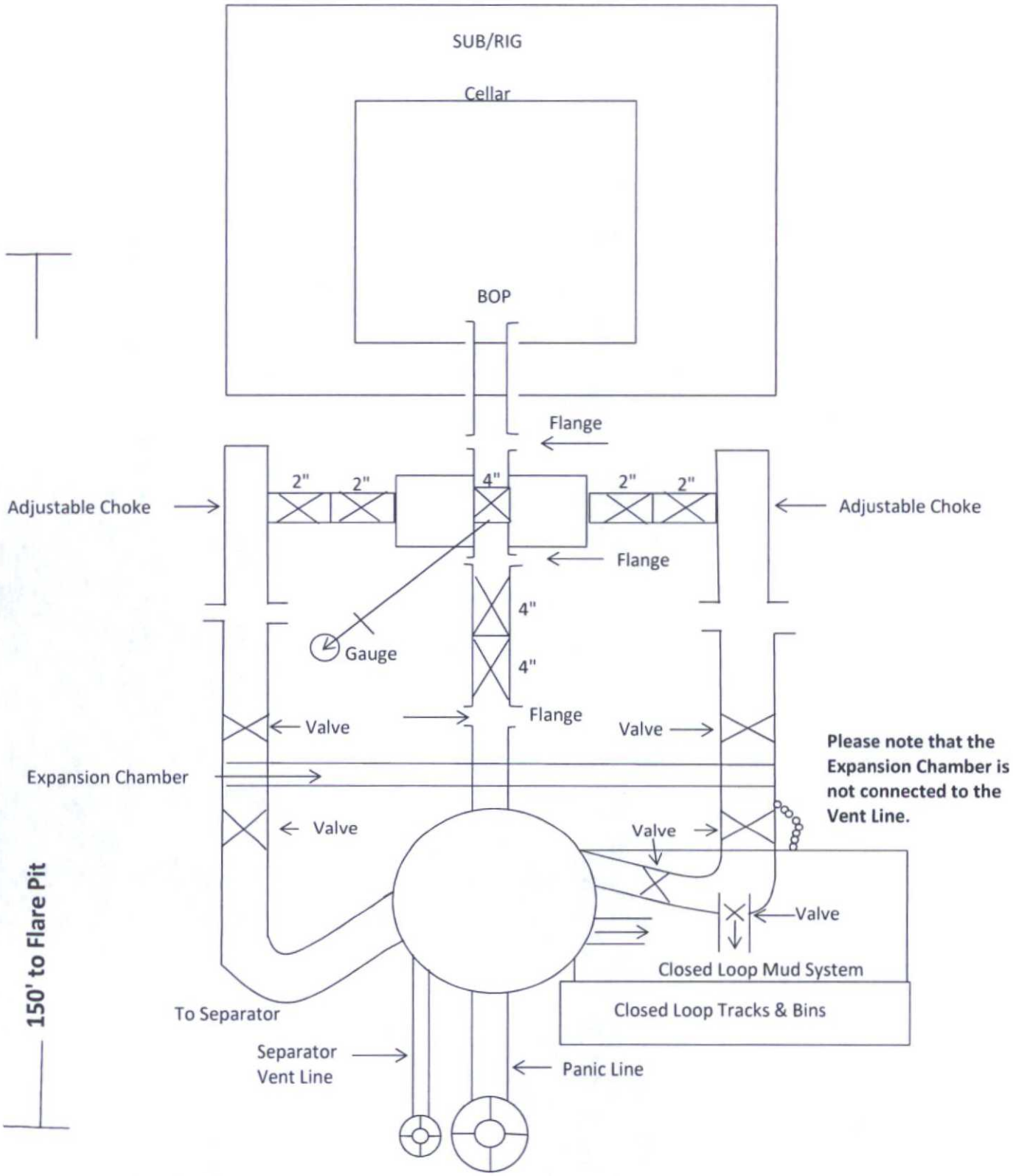


3,000 psi BOP Schematic

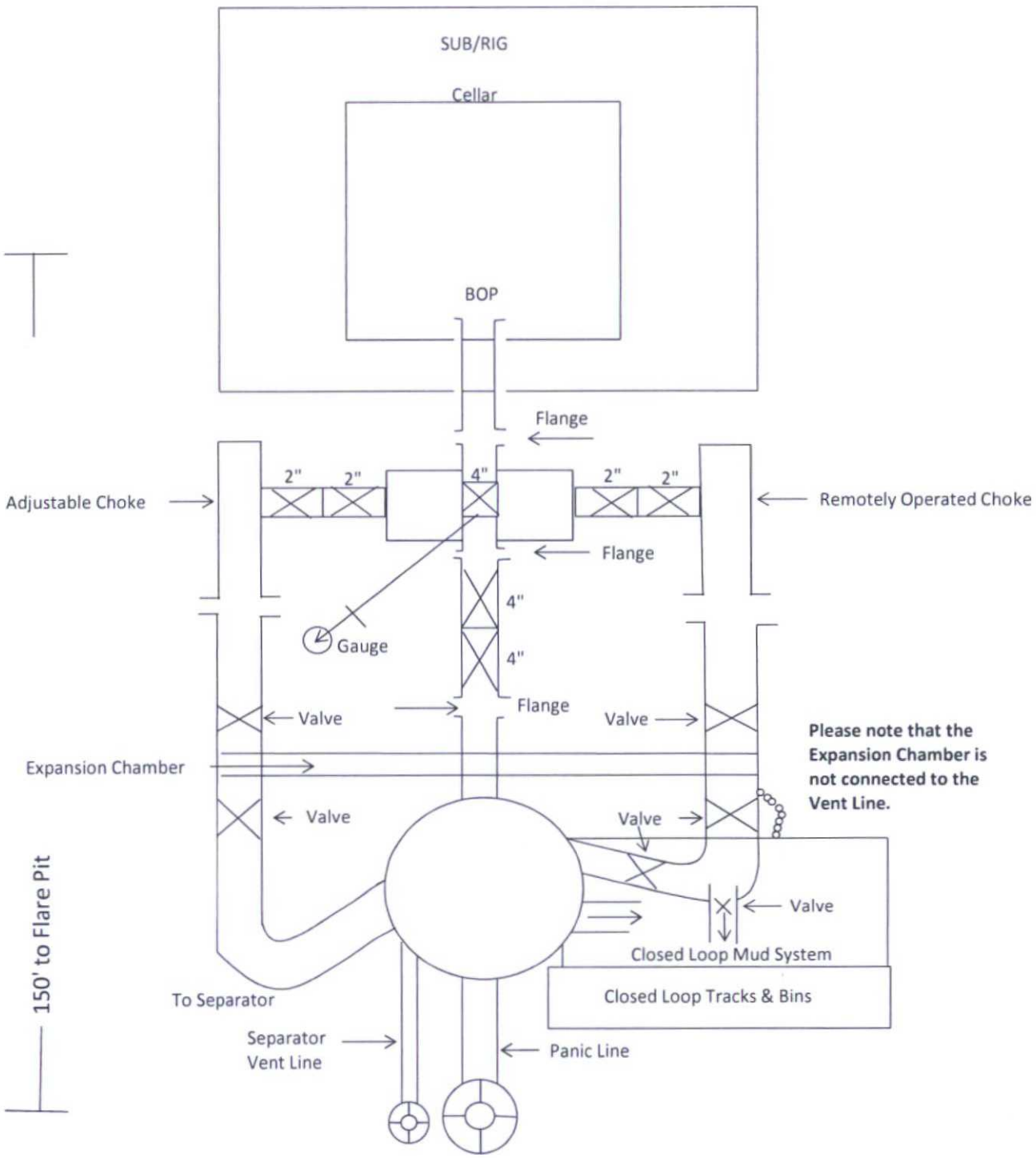


11" 3000# BOP

2M Choke Manifold Equipment



3M Choke Manifold Equipment



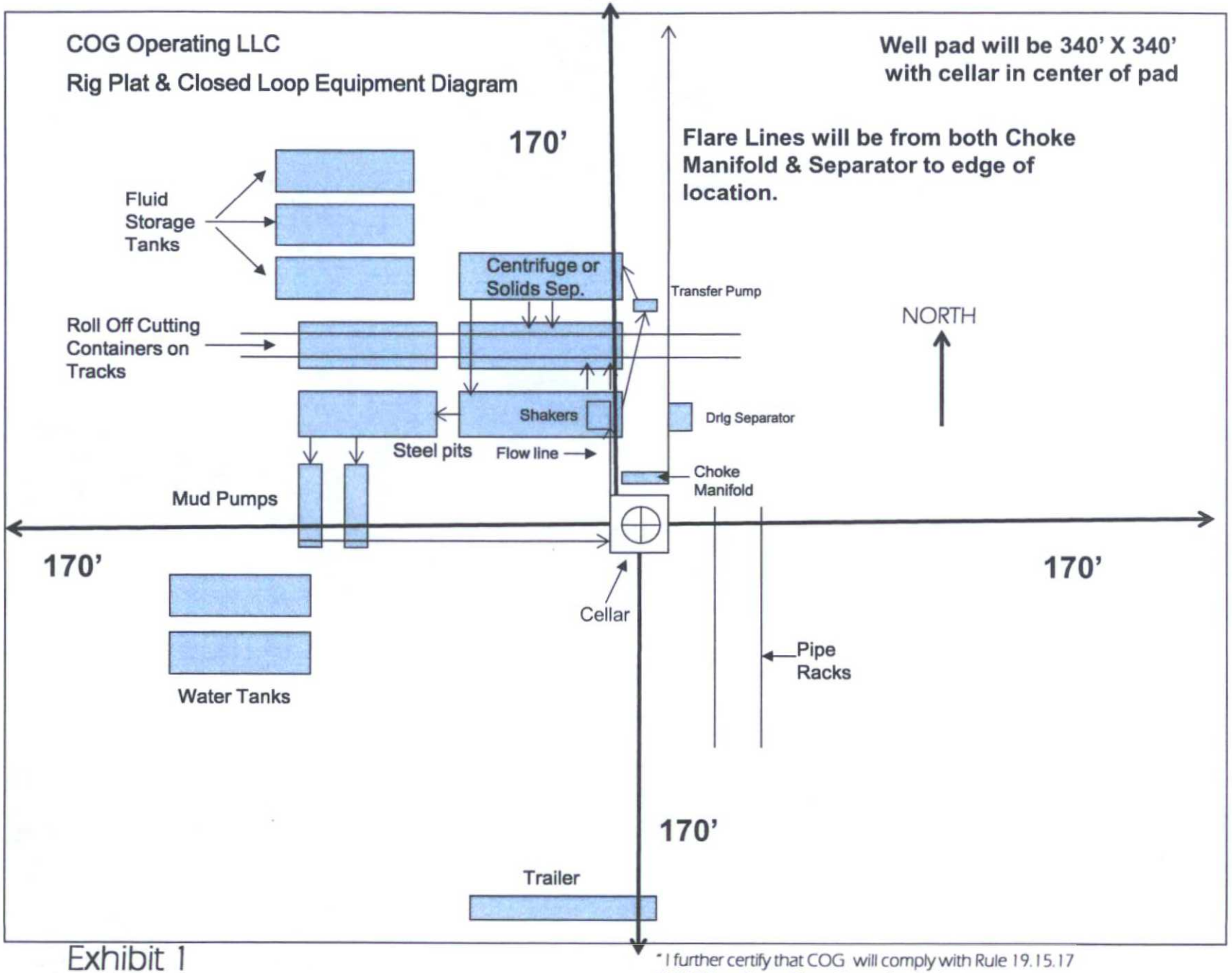


Exhibit 1

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