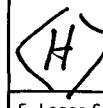


HOBBSOCD

APR 20 2015

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of Work: ☒ DRILL ☐ REENTER		7. If Unit or CA Agreement, Name and No. Lusk Deep Unit - NMNM 070982X	
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		8. Lease Name and Well No. (308161) Lusk Deep Unit A #34H	
2. Name of Operator COG Operating LLC. (229137)		9. API Well No. 70-025-42 F25	
3a. Address 2208 West Main Street Artesia, NM 88210	3b. Phone No. (Include area code) 575-748-6940	10. Field and Pool, or Exploratory Lusk; Bone Spring (41440)	
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 330' FSL & 310' FEL Unit Letter P (SESE) SHL Sec 19-T19S-R32E At proposed prod. Zone 2310' FSL & 380' FEL Unit Letter I (NESE) BHL Sec 18-T19S-R32E		11. Sec., T.R.M. or Blk and Survey or Area Section 19 - T19S - R32E	
14. Distance in miles and direction from nearest town or post office* Approximately 12 miles from Maljamar		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) 330'	16. No. of acres in lease SHL: 320 BHL: 160	17. Spacing Unit dedicated to this well 240	
18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. SHL: 70' BHL: 433' Closest to wellbore: 70'	19. Proposed Depth TVD: 8,340' MD: 15,469'	20. BLM/BIA Bond No. on file NMB000740 & NMB000215	
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3561.3' GL	22. Approximate date work will start* 9/1/2014	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 Mayte Reyes	Name (Printed/Typed) Mayte Reyes	Date 9-19-14
Title Regulatory Analyst		
Approved by (Signature) /s/ STEPHEN J. CAFFEY	Name (Printed/Typed)	Date APR 15 2015
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)

Capitan Controlled Water Basin

*(Instructions on page 2)

APPROVAL SUBJECT TO
GENERAL REQUIREMENTS
AND SPECIAL STIPULATIONS
ATTACHED**PM**
See ATTACHED FOR
CONDITIONS OF APPROVAL

APR 22 2015

1. Geologic Formations

RECEIVED

TVD of target	8340'	Pilot hole depth	NA
MD at TD:	15469'	Deepest expected fresh water:	223'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	724'	Water	
Top of Salt	812'	Salt	
Tansill	2374'		
Yates	2506'		
Seven Rivers	2602'		
Capitan Reef	2772'	Water	
Delaware	4298'	Oil/Gas	
Bone Spring	7115'	Oil/Gas	
1 st Bone Spring	8362'	Target Zone	
2 nd Bone Spring	9063'	Will Not Penetrate	

*H2S, water flows, loss of circulation, abnormal pressures, etc.

2. Casing Program

See COA

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
17.5"	0	250' 861'	13.375"	54.5	J55	STC	3.41	1.22	12.57
12.25"	0	3500	9.625"	36	J55	LTC	1.18	0.88	4.12
12.25"	3500'	4300' 4400'	9.625	40	J55	LTC	1.16	0.99	3.27
8.75"	0	15469'	5.5"	17	P110	LTC	1.87	1.33	3.1
BLM Minimum Safety Factor							1.125	1	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 were used on all SF calculations.
- Assumed 9.2 ppg MW equivalent pore pressure thru entire wellbore.
- Explanation for SFs below BLM's minimum standards:
9 5/8" Burst SF @ 0.88 and 0.99-used BLM's frac gradient scenario to qualify.
For 36# csg Burst strength of 3520 psi $3520/4300'=0.81 >0.70$ and for 40# csg
Burst strength of 3950 psi $3950/4300'=0.91 >0.70$.

COG Operating LLC, Lusk Deep Unit A #34H

	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).	Y
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?	Y
Is well within the designated 4 string boundary.	N
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3 rd 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 2 nd 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

Casing	# Sks	Wt. lb/ gal	Yld ft3/ sack	H ₂ O gal/ sk	500# Comp. Strength (hours)	Slurry Description
Surf.	350	13.5	1.75	9.2	13	Lead: Class C + 4.0% Gel+2% CaCl ₂
	250	14.8	1.34	6.3	6	Tail: Class C + 2% CaCl ₂
Inter.	225	12.7	2.01	11.5	10	1 st stage Lead: 35:65:6 C + 5% Salt + 5 pps Gilsonite
	275	14.8	1.34	6.3	6	1 st stage Tail: Class C + 2% CaCl ₂
						DV Tool/ECP @ 2700'
	700	13.5	1.75	9.2	13	2 nd stage Lead: Class C + 4% Gel+ 2% CaCl ₂
	100	14.8	1.34	6.3	8	2 nd stage Tail: Class C + 1% CaCl ₂
Prod.	1250	12.7	1.89	11.4	22	Lead: 35:65:6 H + Salt + Gilsonite + CFR-3 + HR601
	1400	14.4	1.25	5.7	10	Tail: 50:50:2 Class H+Salt+GasStop+HR601 +CFR-3

See
COA

COG Operating LLC, Lusk Deep Unit A #34H

DV tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Casing String	TOC	% Excess
Surface	0'	50%
Intermediate	0'	50%
Production	0'	35%

4. Pressure Control Equipment

N	A variance is requested for the use of a diverter on the surface casing. See attached for schematic.
---	--

BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	✓	Tested to:
see COA 12-1/4"	13-5/8"	2M	Annular	x	50% of working pressure
			Blind Ram		WP
			Pipe Ram		
			Double Ram		
			Other*		
8-3/4"	9-5/8"	3M	Annular	x	50% testing pressure
			Blind Ram	x	WP
			Pipe Ram	x	
			Double Ram		
			Other*		
			Annular		
			Blind Ram		
			Pipe Ram		
			Double Ram		
			Other*		

*Specify if additional ram is utilized.

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.

COG Operating LLC, Lusk Deep Unit A #34H

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.

N	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.
Y /N	Are anchors required by manufacturer?
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.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. shoe	Fresh Water	8.4-8.6	29	N/C
Surf csg	Int shoe	Brine	10.0-10.2	29	N/C
Int shoe	TD	Cut Brine	8.8-9.2	29	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?	PVT/Pason/Visual Monitoring
---	-----------------------------

6. Logging and Testing Procedures

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.
No	Drill stem test? If yes, explain
No	Coring? If yes, explain

COG Operating LLC, Lusk Deep Unit A #34H

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	3669 psi
Abnormal Temperature	No

If severe losses are encountered in the Capitan Reef and hole conditions allow, dry drilling to TD while using only fresh water in mud system will be the preferred operation. If hole conditions do not allow dry drilling with fresh water – LCM sweeps, cement plugs, air or other loss circulation remedies may be introduced to operations to manage lost circulation. Cement will be circulated to surface in two stages using a stage tool and an external casing packer to isolate the weaker zones in the Capitan Reef.

See
COA

Hydrogen Sulfide (H ₂ S) monitors will be installed prior to drilling out the surface shoe. If H ₂ S 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.	
N	H ₂ S is present
Y	H ₂ S Plan attached

8. Other facets of operation

Is this a walking operation? No

- No casings will be pre-set
- Anti-Collision practices will be used to avoid collision in vertical well bores

Attachments:

- BOP & Choke schematics (Previously submitted)
- Directional plan
- C102 and supporting maps
- Anti-collision report
- Rig plat schematic (Previously submitted)
- H₂S plan schematic (Previously submitted)
- H₂S contingency plan (Previously submitted)
- Interim reclamation plat (Previously submitted)

COG OPERATING, LLC

Lea County, NM

Lusk Deep Unit A 34H

34H - Slot 34H

Lateral

Plan: Plan #1

Standard Planning Report

12 September, 2014

Section Distances

Sec19,T19S,R32E

SHL - Unit P

330'FSL, 310'FEL

PP

563'FSL, 330'FEL

Sec18,T19S,R32E

PBHL - Unit I

2310'FSL, 380'FEL

Archer

Planning Report

Database:	EDM R5000.1 MULTI	Local Co-ordinate Reference:	Well 34H - Slot 34H
Company:	COG OPERATING, LLC	TVD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Project:	Lea County, NM	MD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Site:	Lusk Deep Unit A 34H	North Reference:	Grid
Well:	34H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #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:	Lusk Deep Unit A 34H		
Site Position:		Northing:	596,775.90 usft
From:	Map	Easting:	664,958.90 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.200 in
		Latitude:	32° 38' 22.18 N
		Longitude:	103° 47' 50.82 W
		Grid Convergence:	0.29 °

Well:	34H - Slot 34H		
Well Position	+N/-S	0.00 usft	Northing: 596,775.90 usft
	+E/-W	0.00 usft	Easting: 664,958.90 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 38' 22.18 N
		Longitude:	103° 47' 50.82 W
		Ground Level:	3,561.00 usft

Wellbore:	Lateral		
Magnetics	Model Name	Sample Date	Declination
	HDGM	9/11/2014	7.53
			Dip Angle
			60.65
			Field Strength
			48,687

Design:	Plan #1		
Audit Notes:			
Version:	Phase:	PROTOTYPE	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			359.00

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)		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,910.39	0.00	0.00	7,910.39	0.00	0.00	0.00	0.00	0.00	0.00	
8,728.57	90.00	354.00	8,431.26	518.02	-54.45	11.00	11.00	0.00	354.00	
8,912.31	90.79	359.46	8,430.00	701.38	-64.93	3.00	0.43	2.97	81.78	
15,468.94	90.79	359.46	8,340.00	7,257.10	-127.20	0.00	0.00	0.00	0.00	Lusk Deep 34H PB

Archer

Planning Report

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Company:	COG OPERATING, LLC	TVD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Project:	Lea County, NM	MD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Site:	Lusk Deep Unit A 34H	North Reference:	Grid
Well:	34H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #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)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00	

Archer

Planning Report

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5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,600.00	0.00	0.00	0.00	0.00	0.00	0.00
6,700.00	0.00	0.00	6,700.00	0.00	0.00	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,800.00	0.00	0.00	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,900.00	0.00	0.00	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	7,000.00	0.00	0.00	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,100.00	0.00	0.00	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,200.00	0.00	0.00	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,300.00	0.00	0.00	0.00	0.00	0.00	0.00
7,400.00	0.00	0.00	7,400.00	0.00	0.00	0.00	0.00	0.00	0.00
7,500.00	0.00	0.00	7,500.00	0.00	0.00	0.00	0.00	0.00	0.00
7,600.00	0.00	0.00	7,600.00	0.00	0.00	0.00	0.00	0.00	0.00
7,700.00	0.00	0.00	7,700.00	0.00	0.00	0.00	0.00	0.00	0.00
7,800.00	0.00	0.00	7,800.00	0.00	0.00	0.00	0.00	0.00	0.00
7,900.00	0.00	0.00	7,900.00	0.00	0.00	0.00	0.00	0.00	0.00
7,910.39	0.00	0.00	7,910.39	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 11.00									
7,950.00	4.36	354.00	7,949.96	1.50	-0.16	1.50	11.00	11.00	0.00
8,000.00	9.86	354.00	7,999.56	7.65	-0.80	7.66	11.00	11.00	0.00
8,050.00	15.36	354.00	8,048.33	18.50	-1.94	18.53	11.00	11.00	0.00
8,100.00	20.86	354.00	8,095.84	33.94	-3.57	34.00	11.00	11.00	0.00
8,150.00	26.36	354.00	8,141.64	53.85	-5.66	53.94	11.00	11.00	0.00
8,200.00	31.86	354.00	8,185.31	78.03	-8.20	78.16	11.00	11.00	0.00
8,250.00	37.36	354.00	8,226.44	106.26	-11.17	106.44	11.00	11.00	0.00
8,300.00	42.86	354.00	8,264.67	138.28	-14.53	138.52	11.00	11.00	0.00
8,350.00	48.36	354.00	8,299.64	173.80	-18.27	174.10	11.00	11.00	0.00
8,400.00	53.86	354.00	8,331.02	212.49	-22.33	212.85	11.00	11.00	0.00
8,450.00	59.36	354.00	8,358.53	253.99	-26.70	254.42	11.00	11.00	0.00
8,500.00	64.86	354.00	8,381.91	297.92	-31.31	298.43	11.00	11.00	0.00
8,550.00	70.36	354.00	8,400.95	343.88	-36.14	344.46	11.00	11.00	0.00
8,600.00	75.86	354.00	8,415.47	391.44	-41.14	392.11	11.00	11.00	0.00
8,650.00	81.36	354.00	8,425.35	440.17	-46.26	440.92	11.00	11.00	0.00
8,700.00	86.86	354.00	8,430.48	489.62	-51.46	490.44	11.00	11.00	0.00
8,728.57	90.00	354.00	8,431.26	518.02	-54.45	518.89	11.00	11.00	0.00
Start DLS 3.00 TFO 81.78									
8,800.00	90.31	356.12	8,431.07	589.18	-60.60	590.15	3.00	0.43	2.97
8,900.00	90.73	359.09	8,430.16	689.07	-64.77	690.10	3.00	0.43	2.97
8,912.31	90.79	359.46	8,430.00	701.38	-64.93	702.41	3.00	0.43	2.97
Start 6556.64 hold at 8912.31 MD									
9,000.00	90.79	359.46	8,428.80	789.06	-65.76	790.09	0.00	0.00	0.00
9,100.00	90.79	359.46	8,427.42	889.04	-66.71	890.08	0.00	0.00	0.00
9,200.00	90.79	359.46	8,426.05	989.03	-67.66	990.06	0.00	0.00	0.00

Archer

Planning Report

Database:	EDM R5000.1 MULTI	Local Co-ordinate Reference:	Well 34H - Slot 34H
Company:	COG OPERATING, LLC	TVD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Project:	Lea County, NM	MD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Site:	Lusk Deep Unit A 34H	North Reference:	Grid
Well:	34H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #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)	
9,300.00	90.79	359.46	8,424.68	1,089.02	-68.61	1,090.05	0.00	0.00	0.00	
9,400.00	90.79	359.46	8,423.30	1,189.00	-69.56	1,190.04	0.00	0.00	0.00	
9,500.00	90.79	359.46	8,421.93	1,288.99	-70.51	1,290.03	0.00	0.00	0.00	
9,600.00	90.79	359.46	8,420.56	1,388.98	-71.46	1,390.01	0.00	0.00	0.00	
9,700.00	90.79	359.46	8,419.19	1,488.96	-72.41	1,490.00	0.00	0.00	0.00	
9,800.00	90.79	359.46	8,417.81	1,588.95	-73.36	1,589.99	0.00	0.00	0.00	
9,900.00	90.79	359.46	8,416.44	1,688.93	-74.31	1,689.98	0.00	0.00	0.00	
10,000.00	90.79	359.46	8,415.07	1,788.92	-75.26	1,789.96	0.00	0.00	0.00	
10,100.00	90.79	359.46	8,413.70	1,888.91	-76.21	1,889.95	0.00	0.00	0.00	
10,200.00	90.79	359.46	8,412.32	1,988.89	-77.16	1,989.94	0.00	0.00	0.00	
10,300.00	90.79	359.46	8,410.95	2,088.88	-78.11	2,089.93	0.00	0.00	0.00	
10,400.00	90.79	359.46	8,409.58	2,188.86	-79.06	2,189.91	0.00	0.00	0.00	
10,500.00	90.79	359.46	8,408.21	2,288.85	-80.01	2,289.90	0.00	0.00	0.00	
10,600.00	90.79	359.46	8,406.83	2,388.84	-80.96	2,389.89	0.00	0.00	0.00	
10,700.00	90.79	359.46	8,405.46	2,488.82	-81.91	2,489.88	0.00	0.00	0.00	
10,800.00	90.79	359.46	8,404.09	2,588.81	-82.86	2,589.86	0.00	0.00	0.00	
10,900.00	90.79	359.46	8,402.72	2,688.79	-83.81	2,689.85	0.00	0.00	0.00	
11,000.00	90.79	359.46	8,401.34	2,788.78	-84.76	2,789.84	0.00	0.00	0.00	
11,100.00	90.79	359.46	8,399.97	2,888.77	-85.71	2,889.82	0.00	0.00	0.00	
11,200.00	90.79	359.46	8,398.60	2,988.75	-86.66	2,989.81	0.00	0.00	0.00	
11,300.00	90.79	359.46	8,397.22	3,088.74	-87.61	3,089.80	0.00	0.00	0.00	
11,400.00	90.79	359.46	8,395.85	3,188.72	-88.56	3,189.79	0.00	0.00	0.00	
11,500.00	90.79	359.46	8,394.48	3,288.71	-89.51	3,289.77	0.00	0.00	0.00	
11,600.00	90.79	359.46	8,393.11	3,388.70	-90.46	3,389.76	0.00	0.00	0.00	
11,700.00	90.79	359.46	8,391.73	3,488.68	-91.40	3,489.75	0.00	0.00	0.00	
11,800.00	90.79	359.46	8,390.36	3,588.67	-92.35	3,589.74	0.00	0.00	0.00	
11,900.00	90.79	359.46	8,388.99	3,688.65	-93.30	3,689.72	0.00	0.00	0.00	
12,000.00	90.79	359.46	8,387.62	3,788.64	-94.25	3,789.71	0.00	0.00	0.00	
12,100.00	90.79	359.46	8,386.24	3,888.63	-95.20	3,889.70	0.00	0.00	0.00	
12,200.00	90.79	359.46	8,384.87	3,988.61	-96.15	3,989.69	0.00	0.00	0.00	
12,300.00	90.79	359.46	8,383.50	4,088.60	-97.10	4,089.67	0.00	0.00	0.00	
12,400.00	90.79	359.46	8,382.13	4,188.59	-98.05	4,189.66	0.00	0.00	0.00	
12,500.00	90.79	359.46	8,380.75	4,288.57	-99.00	4,289.65	0.00	0.00	0.00	
12,600.00	90.79	359.46	8,379.38	4,388.56	-99.95	4,389.63	0.00	0.00	0.00	
12,700.00	90.79	359.46	8,378.01	4,488.54	-100.90	4,489.62	0.00	0.00	0.00	
12,800.00	90.79	359.46	8,376.64	4,588.53	-101.85	4,589.61	0.00	0.00	0.00	
12,900.00	90.79	359.46	8,375.26	4,688.52	-102.80	4,689.60	0.00	0.00	0.00	
13,000.00	90.79	359.46	8,373.89	4,788.50	-103.75	4,789.58	0.00	0.00	0.00	
13,100.00	90.79	359.46	8,372.52	4,888.49	-104.70	4,889.57	0.00	0.00	0.00	
13,200.00	90.79	359.46	8,371.14	4,988.47	-105.65	4,989.56	0.00	0.00	0.00	
13,300.00	90.79	359.46	8,369.77	5,088.46	-106.60	5,089.55	0.00	0.00	0.00	
13,400.00	90.79	359.46	8,368.40	5,188.45	-107.55	5,189.53	0.00	0.00	0.00	
13,500.00	90.79	359.46	8,367.03	5,288.43	-108.50	5,289.52	0.00	0.00	0.00	
13,600.00	90.79	359.46	8,365.65	5,388.42	-109.45	5,389.51	0.00	0.00	0.00	
13,700.00	90.79	359.46	8,364.28	5,488.40	-110.40	5,489.50	0.00	0.00	0.00	
13,800.00	90.79	359.46	8,362.91	5,588.39	-111.35	5,589.48	0.00	0.00	0.00	
13,900.00	90.79	359.46	8,361.54	5,688.38	-112.30	5,689.47	0.00	0.00	0.00	
14,000.00	90.79	359.46	8,360.16	5,788.36	-113.25	5,789.46	0.00	0.00	0.00	
14,100.00	90.79	359.46	8,358.79	5,888.35	-114.20	5,889.45	0.00	0.00	0.00	
14,200.00	90.79	359.46	8,357.42	5,988.33	-115.15	5,989.43	0.00	0.00	0.00	
14,300.00	90.79	359.46	8,356.05	6,088.32	-116.10	6,089.42	0.00	0.00	0.00	
14,400.00	90.79	359.46	8,354.67	6,188.31	-117.05	6,189.41	0.00	0.00	0.00	
14,500.00	90.79	359.46	8,353.30	6,288.29	-118.00	6,289.39	0.00	0.00	0.00	
14,600.00	90.79	359.46	8,351.93	6,388.28	-118.95	6,389.38	0.00	0.00	0.00	

Archer Planning Report

Database:	EDM R5000.1 MULTI	Local Co-ordinate Reference:	Well 34H - Slot 34H
Company:	COG OPERATING, LLC	TVD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Project:	Lea County, NM	MD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Site:	Lusk Deep Unit A 34H	North Reference:	Grid
Well:	34H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #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)	
14,700.00	90.79	359.46	8,350.55	6,488.26	-119.90	6,489.37	0.00	0.00	0.00	
14,800.00	90.79	359.46	8,349.18	6,588.25	-120.85	6,589.36	0.00	0.00	0.00	
14,900.00	90.79	359.46	8,347.81	6,688.24	-121.80	6,689.34	0.00	0.00	0.00	
15,000.00	90.79	359.46	8,346.44	6,788.22	-122.75	6,789.33	0.00	0.00	0.00	
15,100.00	90.79	359.46	8,345.06	6,888.21	-123.70	6,889.32	0.00	0.00	0.00	
15,200.00	90.79	359.46	8,343.69	6,988.20	-124.65	6,989.31	0.00	0.00	0.00	
15,300.00	90.79	359.46	8,342.32	7,088.18	-125.60	7,089.29	0.00	0.00	0.00	
15,400.00	90.79	359.46	8,340.95	7,188.17	-126.55	7,189.28	0.00	0.00	0.00	
15,468.94	90.79	359.46	8,340.00	7,257.10	-127.20	7,258.21	0.00	0.00	0.00	
TD at 15468.94										

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
- hit/miss target										
- Shape										
Lusk Deep 34H Surfa	0.00	0.00	0.00	0.00	0.00	596,775.90	664,958.90	32° 38' 22.18 N	103° 47' 50.82 W	
- plan hits target center										
- Point										
Lusk Deep 34H PP	0.00	0.00	0.00	233.38	-21.60	597,009.28	664,937.30	32° 38' 24.49 N	103° 47' 51.06 W	
- plan misses target center by 234.38usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)										
- Point										
Lusk Deep 34H PBHL	0.00	0.00	8,340.00	7,257.10	-127.20	604,033.00	664,831.70	32° 39' 34.00 N	103° 47' 51.88 W	
- plan hits target center										
- Point										

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
7,910.39	7,910.39	0.00	0.00	Start Build 11.00	
8,728.57	8,431.26	518.02	-54.45	Start DLS 3.00 TFO 81.78	
8,912.31	8,430.00	701.38	-64.93	Start 6556.64 hold at 8912.31 MD	
15,468.94	8,340.00	7,257.10	-127.20	TD at 15468.94	

COG OPERATING, LLC

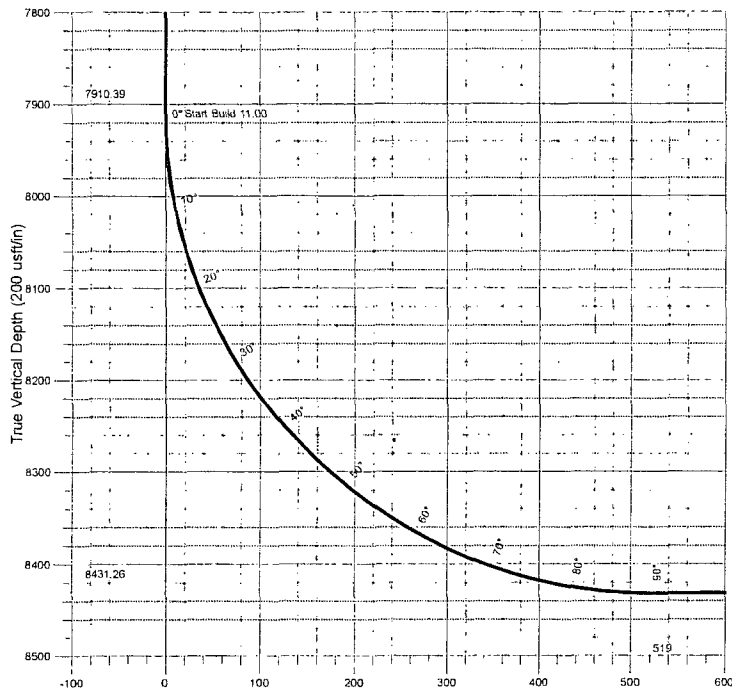
Field: Lea County, NM
Site: Lusk Deep Unit A 34H
Well: 34H
Wellbore: Lateral
Plan: Plan #1

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	7910.39	0.00	0.00	7910.39	0.00	0.00	0.00	0.00	0.00	
3	8728.57	90.00	354.00	8431.26	518.02	-54.45	11.00	354.00	518.89	
4	8912.31	90.79	359.46	8430.00	701.38	-64.93	3.00	81.78	702.41	
5	15468.94	90.79	359.46	8340.00	7257.10	-127.20	0.00	0.00	7258.21	Lusk Deep 34H PBHL

TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Lusk Deep 34H PP	0.00	233.38	-21.60	597009.28	664937.30	32° 38' 24.49 N	103° 47' 51.06 W	Point
Lusk Deep 34H Surface	0.00	0.00	0.00	596775.90	664958.90	32° 38' 22.18 N	103° 47' 50.82 W	Point
Lusk Deep 34H PBHL	8340.00	7257.10	-127.20	604033.00	664831.70	32° 39' 34.00 N	103° 47' 51.88 W	Point



Section Distances

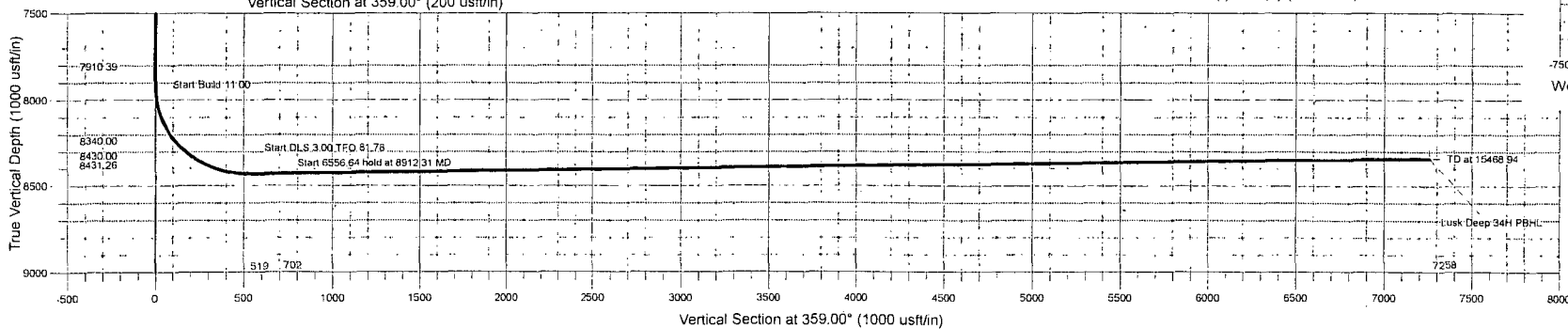
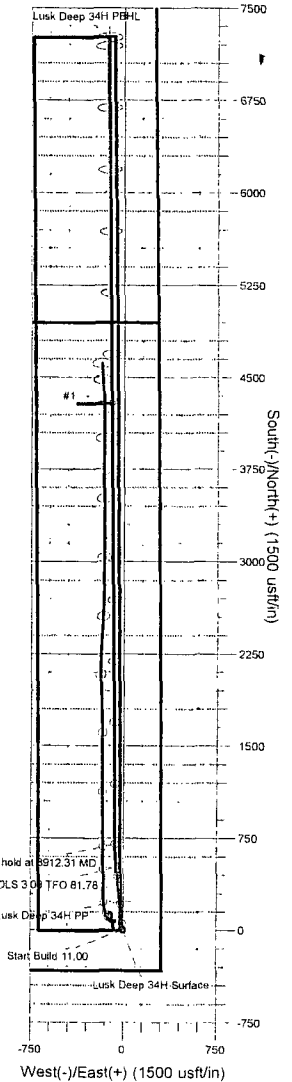
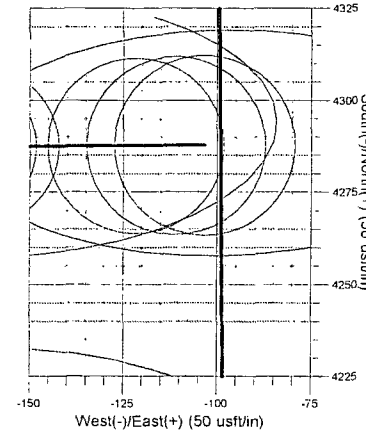
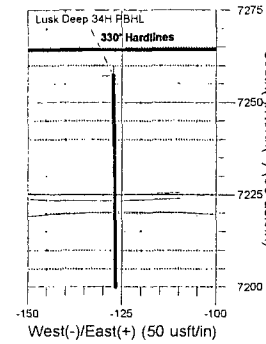
Sec19, T19S, R32E
SHL - Unit P
330° FSL, 310° FEL
PP
563° FSL, 330° FEL
Sec18, T19S, R32E
PBHL - Unit I
2310° FSL, 380° FEL



Azimuths to Grid North
True North: -0.29°
Magnetic North: 7.24°

Magnetic Field
Strength: 48687.3snT
Dip Angle: 60.65°
Date: 9/11/2014
Model: HDGM

Surveys for offset #1
are Inc-only



Archer

ARCHER DIRECTIONAL DRILLING SERVICES
12101 Cutten Rd. Houston, Texas 77066
Phone: 281-301-2600 Fax: 281-301-2795

Design: Plan #1 (34H/Lateral)
Created By: Ivonne Gonzalez
Date: 8:50, September 12 2014

COG OPERATING, LLC

**Lea County, NM
Lusk Deep Unit A 34H
34H**

**Lateral
Plan #1**

Anticollision Report

12 September, 2014

Archer

Anticollision Report

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well 34H - Slot 34H
Project:	Lea County, NM	TVD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Reference Site:	Lusk Deep Unit A 34H	MD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	34H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral	Database:	EDM R5000.1 MULTI
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Reference	Plan #1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 500.00 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date: 9/12/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	15,468.94	Plan #1 (Lateral)	MWD+HDGM	OWSG MWD + HDGM

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Lusk Deep Unit A 34H						
#1 - Original Hole - Surveys	12,499.58	8,385.41	121.03	36.38	1.430	Level 3, CC
#1 - Original Hole - Surveys	12,500.00	8,385.40	121.03	36.38	1.430	Level 3, ES, SF
23H - Original Hole - Surveys	825.91	823.93	69.31	63.70	12.359	CC
23H - Original Hole - Surveys	8,280.80	8,251.64	92.92	36.73	1.654	ES, SF

Offset Design												
Lusk Deep Unit A 34H - #1 - Original Hole - Surveys												
Survey Program: 2132.MWD												
Reference												
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi-Major Axis (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)
												Separation Factor
12,100.00	8,386.24	8,390.92	8,389.17	64.01	15.65	-93.98		4,287.04	-219.86	417.47	338.16	79.30
12,200.00	8,384.87	8,389.54	8,387.79	65.31	15.65	-93.33		4,287.04	-219.89	323.07	242.43	80.64
12,300.00	8,383.50	8,388.16	8,386.41	66.61	15.65	-92.67		4,287.04	-219.92	233.39	151.41	81.98
12,400.00	8,382.13	8,386.78	8,385.03	67.93	15.64	-92.02		4,287.04	-219.96	156.72	73.40	83.32
12,499.58	8,380.76	8,385.41	8,383.65	69.24	15.64	-91.37		4,287.04	-219.99	121.03	36.38	84.65
12,500.00	8,380.75	8,385.40	8,383.65	69.25	15.64	-91.37		4,287.04	-219.99	121.03	36.38	84.65
12,600.00	8,379.38	8,384.02	8,382.27	70.57	15.64	-90.71		4,287.04	-220.02	157.26	71.27	85.99
12,700.00	8,378.01	8,382.64	8,380.89	71.90	15.63	-90.06		4,287.04	-220.05	234.12	146.80	87.32
12,800.00	8,376.64	8,381.26	8,379.51	73.24	15.63	-89.41		4,287.04	-220.09	323.86	235.21	88.65
12,900.00	8,375.26	8,379.88	8,378.13	74.58	15.63	-88.76		4,287.04	-220.12	418.28	328.31	89.97

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Archer

Anticollision Report

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well 34H - Slot 34H
Project:	Lea County, NM	TVD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Reference Site:	Lusk Deep Unit A 34H	MD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	34H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM R5000.1 MULTI
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:
Lusk Deep Unit A 34H - 23H - Original Hole - Surveys													0.00 usft
Survey Program: 100-NS-GYRO-MS, 8775-MWD - Std													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	0.00	0.00	0.00	0.00	-90.02	-0.02	-70.00	70.03				
100.00	100.00	97.80	97.80	0.15	0.20	-89.97	0.03	-70.14	70.14	69.83	0.31	225.045	
200.00	200.00	197.98	197.98	0.50	0.63	-89.83	0.21	-70.31	70.31	69.34	0.97	72.607	
300.00	300.00	297.90	297.90	0.86	1.07	-89.54	0.57	-70.39	70.39	68.72	1.67	42.222	
400.00	400.00	398.30	398.29	1.22	1.47	-89.04	1.18	-70.24	70.25	67.87	2.38	29.498	
500.00	500.00	498.04	498.03	1.58	1.88	-88.39	1.97	-69.99	70.01	66.90	3.12	22.464	
600.00	600.00	598.38	598.37	1.94	2.30	-87.62	2.90	-69.68	69.74	65.87	3.87	18.031	
700.00	700.00	698.08	698.06	2.30	2.74	-86.84	3.83	-69.32	69.42	64.80	4.62	15.019	
800.00	800.00	798.10	798.08	2.65	3.19	-86.15	4.66	-69.17	69.32	63.91	5.41	12.814	
825.91	825.91	823.93	823.91	2.75	3.30	-85.98	4.86	-69.14	69.31	63.70	5.61	12.359 CC	
900.00	900.00	897.78	897.75	3.01	3.62	-85.51	5.44	-69.22	69.44	63.27	6.17	11.250	
1,000.00	1,000.00	997.66	997.63	3.37	4.04	-84.65	6.51	-69.58	69.88	62.96	6.92	10.099	
1,100.00	1,100.00	1,097.17	1,097.12	3.73	4.48	-83.05	8.56	-70.23	70.75	63.08	7.68	9.218	
1,200.00	1,200.00	1,196.50	1,196.38	4.09	4.92	-80.40	12.08	-71.45	72.48	64.05	8.43	8.597	
1,300.00	1,300.00	1,295.62	1,295.33	4.45	5.37	-76.50	17.57	-73.21	75.34	66.14	9.20	8.191	
1,400.00	1,400.00	1,394.49	1,393.85	4.81	5.83	-71.33	25.47	-75.38	79.68	69.69	9.99	7.977	
1,500.00	1,500.00	1,492.50	1,491.26	5.16	6.30	-65.21	36.00	-77.95	86.12	75.32	10.80	7.973	
1,600.00	1,600.00	1,593.71	1,591.67	5.52	6.76	-58.75	48.44	-79.82	93.58	81.92	11.66	8.029	
1,700.00	1,700.00	1,696.75	1,694.14	5.88	7.20	-53.21	59.24	-79.21	98.99	86.45	12.53	7.899	
1,800.00	1,800.00	1,800.59	1,797.75	6.24	7.60	-49.52	65.64	-76.91	101.12	87.73	13.39	7.554	
1,900.00	1,900.00	1,901.75	1,898.82	6.60	7.97	-47.29	68.40	-74.10	100.85	86.67	14.18	7.114	
2,000.00	2,000.00	2,003.70	2,000.73	6.96	8.34	-46.02	68.74	-71.24	99.04	84.20	14.84	6.675	
2,100.00	2,100.00	2,103.60	2,100.59	7.31	8.68	-45.22	67.79	-68.30	96.27	80.84	15.43	6.240	
2,200.00	2,200.00	2,201.46	2,198.43	7.67	8.99	-44.88	67.12	-66.83	94.72	78.67	16.05	5.902	
2,300.00	2,300.00	2,301.51	2,298.47	8.03	9.32	-44.90	66.75	-66.51	94.23	77.55	16.68	5.649	
2,356.09	2,356.09	2,357.13	2,354.09	8.23	9.54	-44.73	66.84	-66.22	94.09	77.00	17.09	5.507	
2,400.00	2,400.00	2,400.67	2,397.63	8.39	9.72	-44.57	67.09	-66.09	94.18	76.77	17.40	5.411	
2,500.00	2,500.00	2,500.20	2,497.16	8.75	10.14	-44.05	68.15	-65.92	94.82	76.61	18.21	5.206	
2,600.00	2,600.00	2,600.00	2,596.95	9.11	10.58	-43.33	69.64	-65.70	95.74	76.72	19.03	5.032	
2,700.00	2,700.00	2,699.77	2,696.69	9.47	11.01	-42.41	71.54	-65.34	96.90	77.05	19.85	4.881	
2,800.00	2,800.00	2,799.53	2,796.43	9.82	11.44	-41.31	73.89	-64.93	98.37	77.69	20.69	4.756	
2,900.00	2,900.00	2,899.44	2,896.30	10.18	11.88	-40.02	76.58	-64.31	100.02	78.49	21.53	4.646	
3,000.00	3,000.00	3,000.37	2,997.19	10.54	12.32	-38.66	79.08	-63.26	101.27	78.89	22.39	4.524	
3,100.00	3,100.00	3,102.45	3,099.27	10.90	12.69	-38.33	79.25	-62.65	101.03	77.90	23.13	4.368	
3,200.00	3,200.00	3,203.00	3,199.79	11.26	12.99	-39.19	77.10	-62.86	99.50	75.73	23.77	4.186	
3,300.00	3,300.00	3,302.86	3,299.61	11.62	13.30	-40.43	74.41	-63.39	97.76	73.36	24.41	4.006	
3,400.00	3,400.00	3,402.33	3,399.05	11.97	13.62	-41.63	72.05	-64.04	96.40	71.34	25.06	3.847	
3,500.00	3,500.00	3,502.12	3,498.82	12.33	13.96	-42.83	69.98	-64.87	95.43	69.70	25.73	3.709	
3,600.00	3,600.00	3,602.45	3,599.08	12.69	14.31	-45.01	66.72	-66.74	94.38	68.01	26.37	3.579	
3,659.29	3,659.29	3,660.73	3,657.29	12.90	14.53	-46.67	64.53	-68.40	94.04	67.31	26.73	3.519	
3,700.00	3,700.00	3,700.00	3,696.52	13.05	14.68	-47.70	63.39	-69.66	94.20	67.23	26.97	3.493	
3,800.00	3,800.00	3,798.88	3,795.34	13.41	15.04	-49.57	62.22	-73.03	95.98	68.45	27.53	3.487	
3,900.00	3,900.00	3,897.66	3,894.04	13.77	15.41	-50.71	62.88	-76.84	99.36	71.30	28.06	3.541	
4,000.00	4,000.00	3,997.12	3,993.40	14.13	15.78	-51.73	64.10	-81.24	103.59	74.99	28.60	3.622	
4,100.00	4,100.00	4,097.21	4,093.38	14.48	16.16	-52.56	65.57	-85.64	107.96	78.81	29.15	3.703	
4,200.00	4,200.00	4,197.77	4,193.86	14.84	16.55	-53.01	67.31	-89.37	111.96	82.22	29.74	3.765	
4,300.00	4,300.00	4,299.23	4,295.27	15.20	16.96	-53.00	69.19	-91.82	115.01	84.61	30.39	3.784	
4,400.00	4,400.00	4,399.18	4,395.18	15.56	17.37	-52.59	71.29	-93.22	117.39	86.28	31.11	3.773	
4,500.00	4,500.00	4,499.10	4,495.06	15.92	17.79	-52.00	73.75	-94.38	119.81	87.95	31.86	3.760	
4,600.00	4,600.00	4,599.30	4,595.23	16.28	18.21	-51.51	76.02	-95.60	122.17	89.57	32.61	3.747	
4,700.00	4,700.00	4,699.52	4,695.43	16.63	18.64	-51.10	78.07	-96.74	124.34	90.99	33.35	3.728	
4,800.00	4,800.00	4,799.30	4,795.18	16.99	19.07	-50.66	80.16	-97.80	126.49	92.39	34.10	3.710	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Archer

Anticollision Report

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well 34H - Slot 34H
Project:	Lea County, NM	TVD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Reference Site:	Lusk Deep Unit A 34H	MD Reference:	3561'GL+19'KB @ 3580.00usft (Planning)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	34H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Lateral	Database:	EDM R5000.1 MULTI
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design: Lusk Deep Unit A 34H - 23H - Original Hole - Surveys													Offset Site Error:	0.00 usft
Survey Program: 100-NS-GYRO-MS-8775-MWD - Std													Offset Well Error:	0.00 usft
Reference	Offset	Semi-Major Axis		Highside		Offset Wellbore Centre		Distance		Minimum	Separation	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Toolface (°)	+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)			
4,900.00	4,900.00	4,899.02	4,894.86	17.35	19.51	-50.28	82.30	-99.06	128.82	93.99	34.84	3.698		
5,000.00	5,000.00	4,999.20	4,995.01	17.71	19.95	-49.75	84.74	-100.09	131.18	95.57	35.61	3.684		
5,100.00	5,100.00	5,099.20	5,094.98	18.07	20.38	-49.07	87.41	-100.79	133.45	97.05	36.41	3.666		
5,200.00	5,200.00	5,199.66	5,195.40	18.43	20.82	-48.28	90.19	-101.16	135.55	98.32	37.23	3.641		
5,300.00	5,300.00	5,299.60	5,295.30	18.79	21.25	-47.56	92.77	-101.44	137.49	99.45	38.04	3.614		
5,400.00	5,400.00	5,399.93	5,395.60	19.14	21.69	-47.01	95.00	-101.90	139.33	100.49	38.84	3.587		
5,500.00	5,500.00	5,499.44	5,495.09	19.50	22.13	-46.57	97.06	-102.54	141.23	101.61	39.62	3.565		
5,600.00	5,600.00	5,600.07	5,595.70	19.86	22.58	-46.28	98.86	-103.39	143.06	102.68	40.38	3.543		
5,700.00	5,700.00	5,700.66	5,696.28	20.22	23.03	-46.02	100.31	-103.94	144.46	103.32	41.15	3.511		
5,800.00	5,800.00	5,800.75	5,796.36	20.58	23.47	-45.70	101.70	-104.22	145.62	103.69	41.93	3.473		
5,900.00	5,900.00	5,900.55	5,896.15	20.94	23.91	-45.37	103.13	-104.48	146.82	104.10	42.72	3.437		
6,000.00	6,000.00	6,001.10	5,996.68	21.30	24.35	-45.04	104.50	-104.64	147.89	104.38	43.51	3.399		
6,100.00	6,100.00	6,100.99	6,096.57	21.65	24.78	-44.70	105.78	-104.67	148.82	104.51	44.31	3.358		
6,200.00	6,200.00	6,201.02	6,196.59	22.01	25.20	-44.26	107.25	-104.53	149.77	104.64	45.13	3.319		
6,300.00	6,300.00	6,301.59	6,297.15	22.37	25.62	-43.83	108.58	-104.24	150.52	104.57	45.95	3.276		
6,400.00	6,400.00	6,401.58	6,397.14	22.73	26.03	-43.50	109.60	-103.99	151.09	104.33	46.76	3.231		
6,500.00	6,500.00	6,501.34	6,496.89	23.09	26.45	-43.20	110.61	-103.88	151.74	104.17	47.57	3.190		
6,600.00	6,600.00	6,601.15	6,596.70	23.45	26.88	-42.90	111.73	-103.84	152.54	104.16	48.37	3.153		
6,700.00	6,700.00	6,701.27	6,696.80	23.80	27.31	-42.61	112.86	-103.82	153.36	104.18	49.18	3.118		
6,800.00	6,800.00	6,801.34	6,796.87	24.16	27.75	-42.37	113.86	-103.86	154.11	104.14	49.98	3.084		
6,900.00	6,900.00	6,900.93	6,896.46	24.52	28.19	-42.26	114.70	-104.21	154.98	104.25	50.73	3.055		
7,000.00	7,000.00	7,000.70	6,996.22	24.88	28.64	-42.22	115.55	-104.86	156.05	104.60	51.45	3.033		
7,100.00	7,100.00	7,100.00	7,095.51	25.24	29.09	-42.18	116.57	-105.62	157.32	105.15	52.17	3.016		
7,200.00	7,200.00	7,198.53	7,194.02	25.60	29.54	-42.06	118.21	-106.68	159.28	106.38	52.90	3.011		
7,300.00	7,300.00	7,299.30	7,294.77	25.96	30.00	-41.90	120.22	-107.85	161.54	107.88	53.66	3.011		
7,400.00	7,400.00	7,401.29	7,396.75	26.31	30.46	-41.90	121.26	-108.79	162.92	108.54	54.38	2.996		
7,500.00	7,500.00	7,500.89	7,496.34	26.67	30.90	-41.98	121.76	-109.57	163.81	108.74	55.07	2.974		
7,600.00	7,600.00	7,601.48	7,596.92	27.03	31.35	-41.91	122.53	-109.98	164.65	108.83	55.83	2.949		
7,700.00	7,700.00	7,703.22	7,698.67	27.39	31.74	-41.76	122.93	-109.74	164.79	108.23	56.55	2.914		
7,800.00	7,800.00	7,805.60	7,801.03	27.75	32.10	-41.36	122.78	-108.08	163.61	106.36	57.25	2.858		
7,900.00	7,900.00	7,905.20	7,900.60	28.11	32.45	-40.81	122.51	-105.80	161.89	103.93	57.96	2.793		
8,000.00	7,999.56	8,004.88	8,000.27	28.46	32.80	-36.67	121.73	-104.09	153.92	96.73	57.19	2.691		
8,100.00	8,095.84	8,099.09	8,094.46	28.81	33.11	-45.31	120.29	-103.94	132.40	76.93	55.47	2.387		
8,200.00	8,185.31	8,187.53	8,182.88	29.13	33.37	-64.88	118.63	-104.93	104.90	50.32	54.58	1.922		
8,280.80	8,250.36	8,251.64	8,246.98	29.38	33.56	-88.70	117.44	-105.75	92.92	36.73	56.20	1.654 ES, SF		
8,300.00	8,264.67	8,265.73	8,261.06	29.44	33.60	-94.47	117.18	-105.94	93.83	37.36	56.46	1.682		
8,400.00	8,331.02	8,330.66	8,325.98	29.74	33.79	-117.45	116.04	-106.86	128.28	73.80	54.49	2.354		
8,500.00	8,381.91	8,379.65	8,374.95	30.05	33.94	-126.14	115.10	-107.63	198.18	147.58	50.60	3.916		
8,600.00	8,415.47	8,411.28	8,406.57	30.38	34.04	-121.63	114.45	-108.18	285.08	234.10	50.98	5.592		
8,700.00	8,430.48	8,424.50	8,419.79	30.72	34.08	-96.82	114.17	-108.42	379.84	322.24	57.60	6.594		
8,800.00	8,431.07	8,423.21	8,418.50	31.09	34.08	-80.69	114.20	-108.39	477.49	419.96	57.54	8.299		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



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

closed) (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
CP 00563		LE		1	1	2	19	19S	32E	612118	3613376*	300		
CP 00640		LE		2	2	19	19S	32E	612621	3613280*		260	102	158

Average Depth to Water: **102 feet**

Minimum Depth: **102 feet**

Maximum Depth: **102 feet**

Record Count: 2

PLSS Search:

Section(s): 19

Township: 19S

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

(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
CP 00073			LE	2	4	34	19S	32E		617502	3609301*	575		
CP 00075			LE	2	4	34	19S	32E		617502	3609301*	575		
CP 00563			LE	1	1	2	19	19S	32E	612118	3613376*	300		
CP 00639			LE	3	1	20	19S	32E		613029	3612880*	350	345	5
CP 00640			LE	2	2	19	19S	32E		612621	3613280*	260	102	158

Average Depth to Water: **223 feet**

Minimum Depth: **102 feet**

Maximum Depth: **345 feet**

Record Count: 5

PLSS Search:

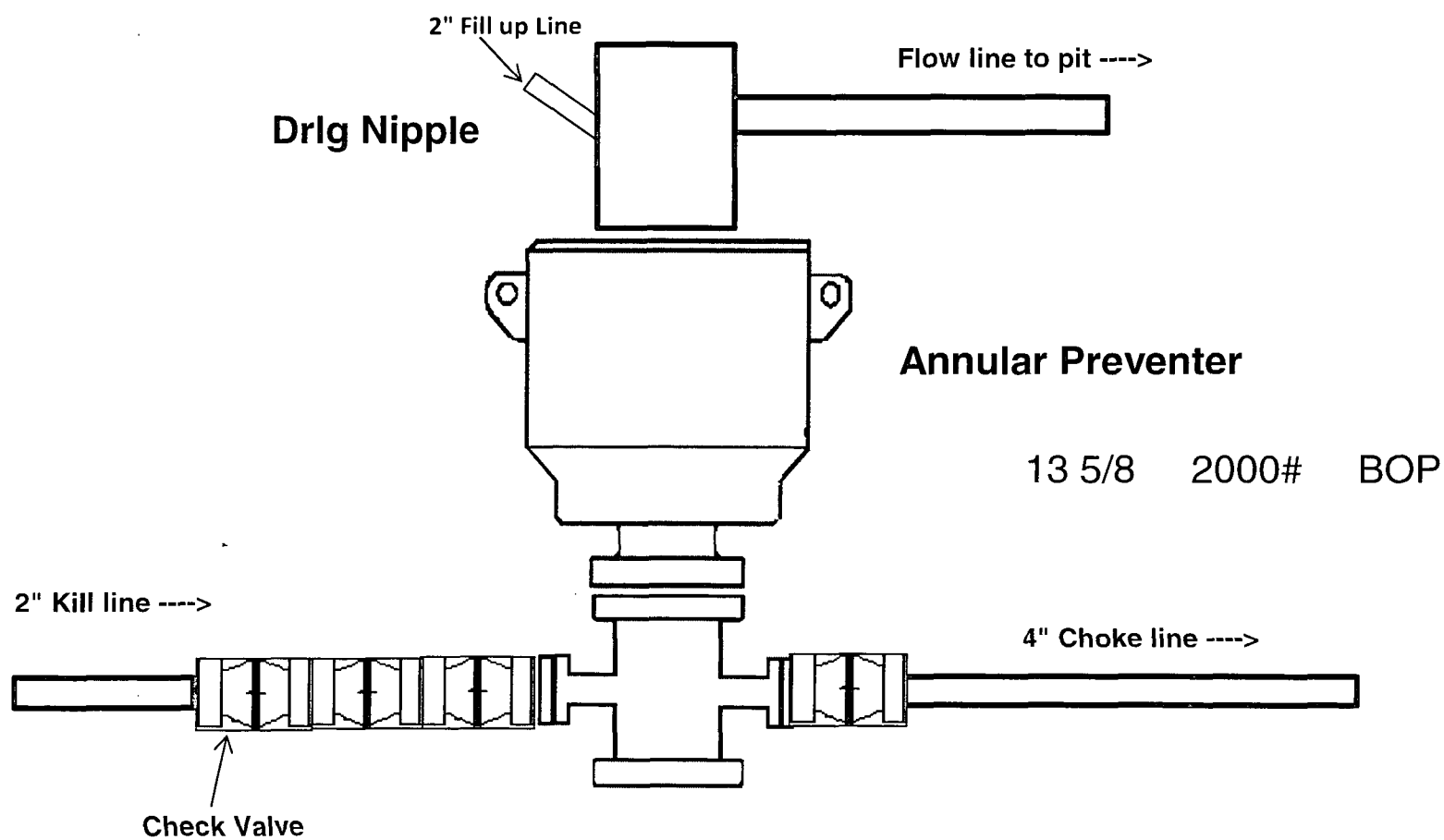
Township: 19S

Range: 32E

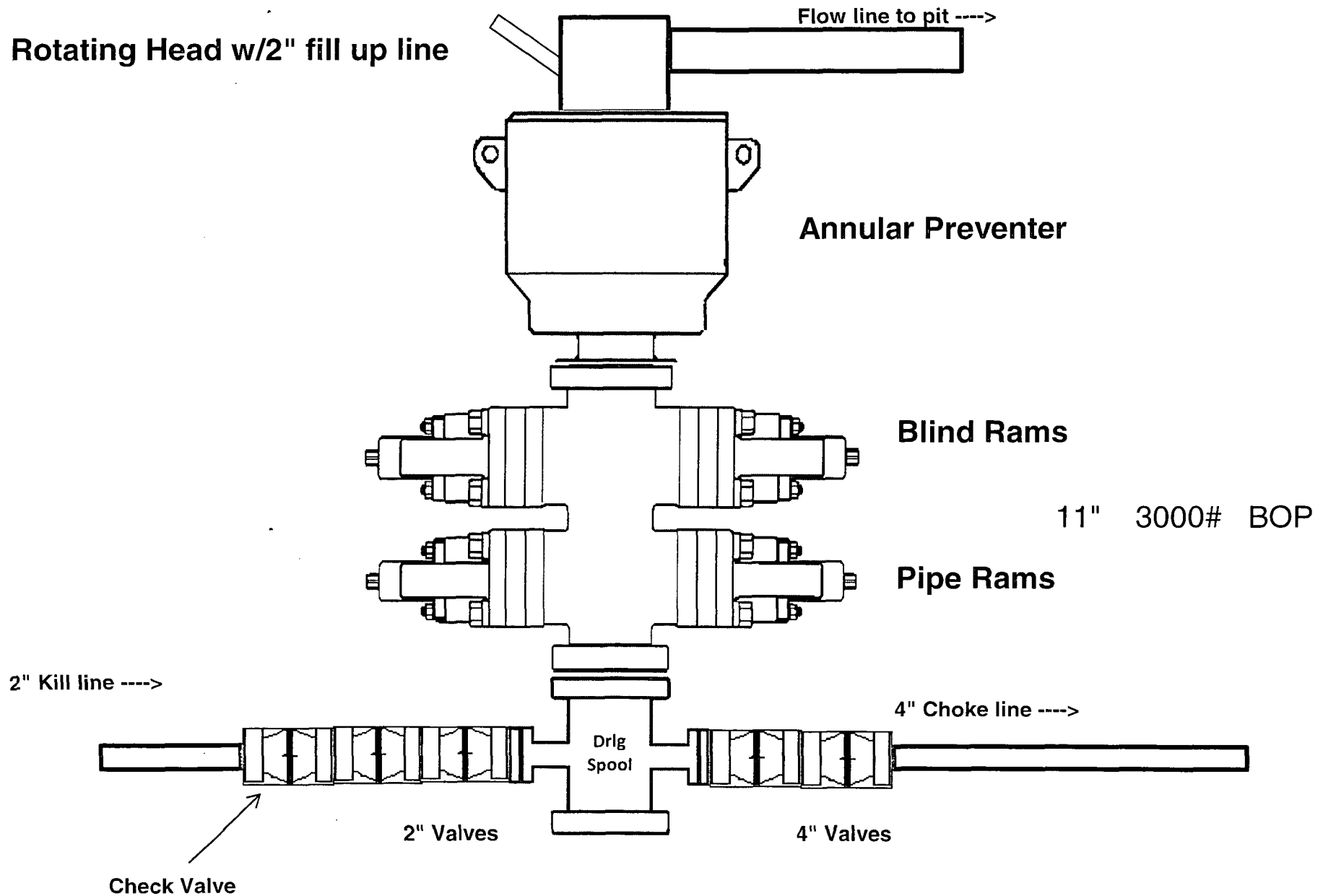
*UTM location was derived from PLSS - see Help

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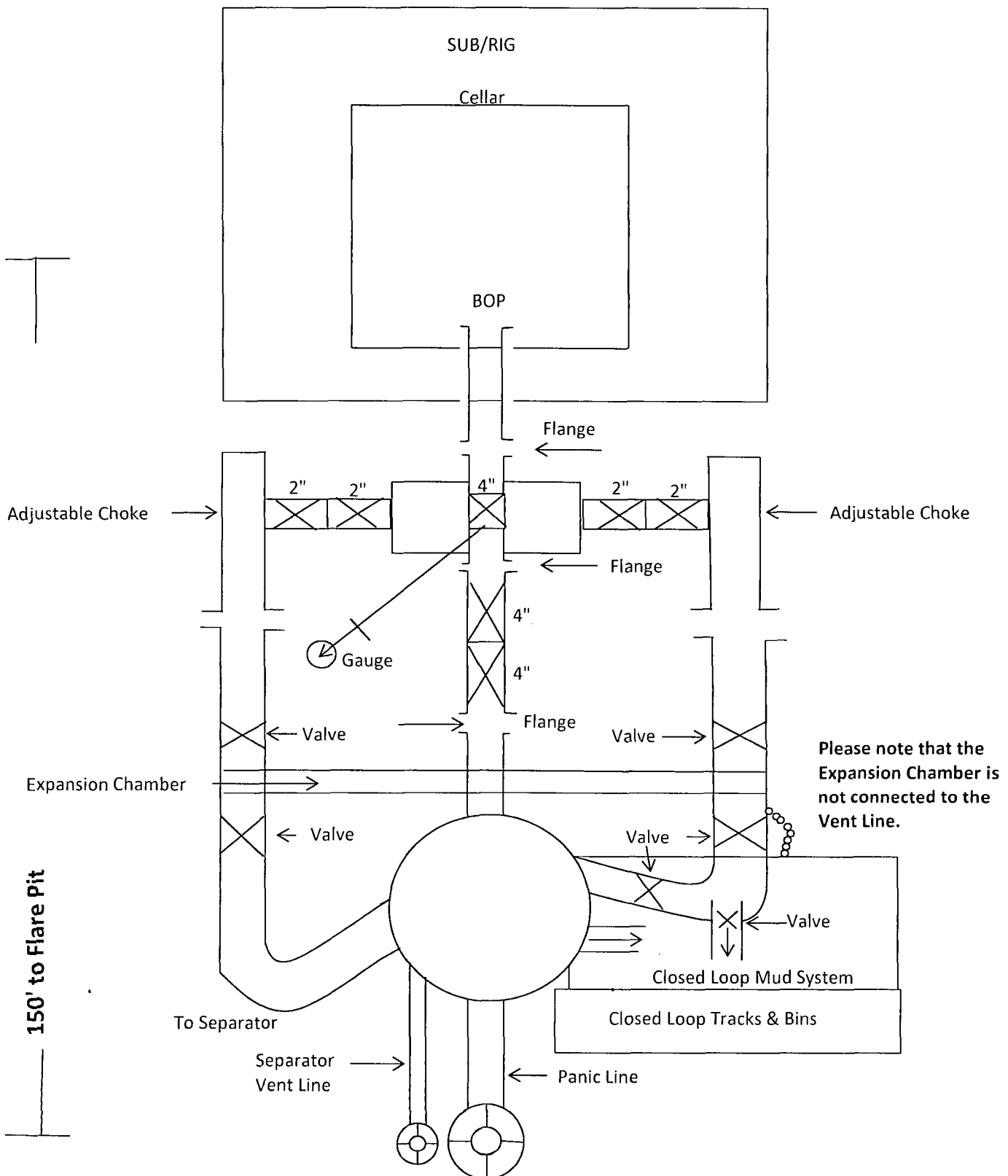
2,000 psi BOP Schematic



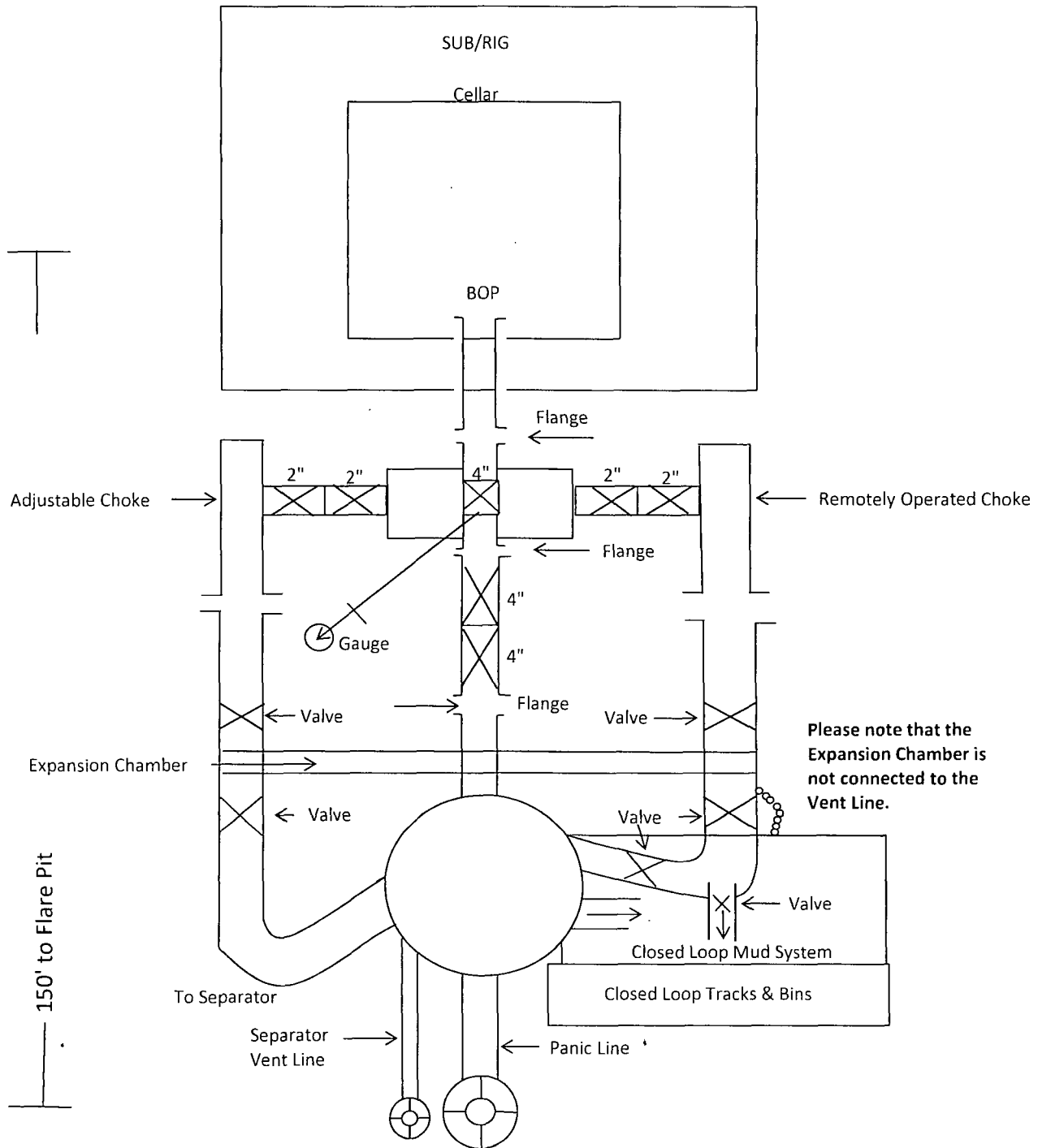
3,000 psi BOP Schematic



2M Choke Manifold Equipment



3M Choke Manifold Equipment



COG Operating LLC

Rig Plat & Closed Loop Equipment Diagram

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

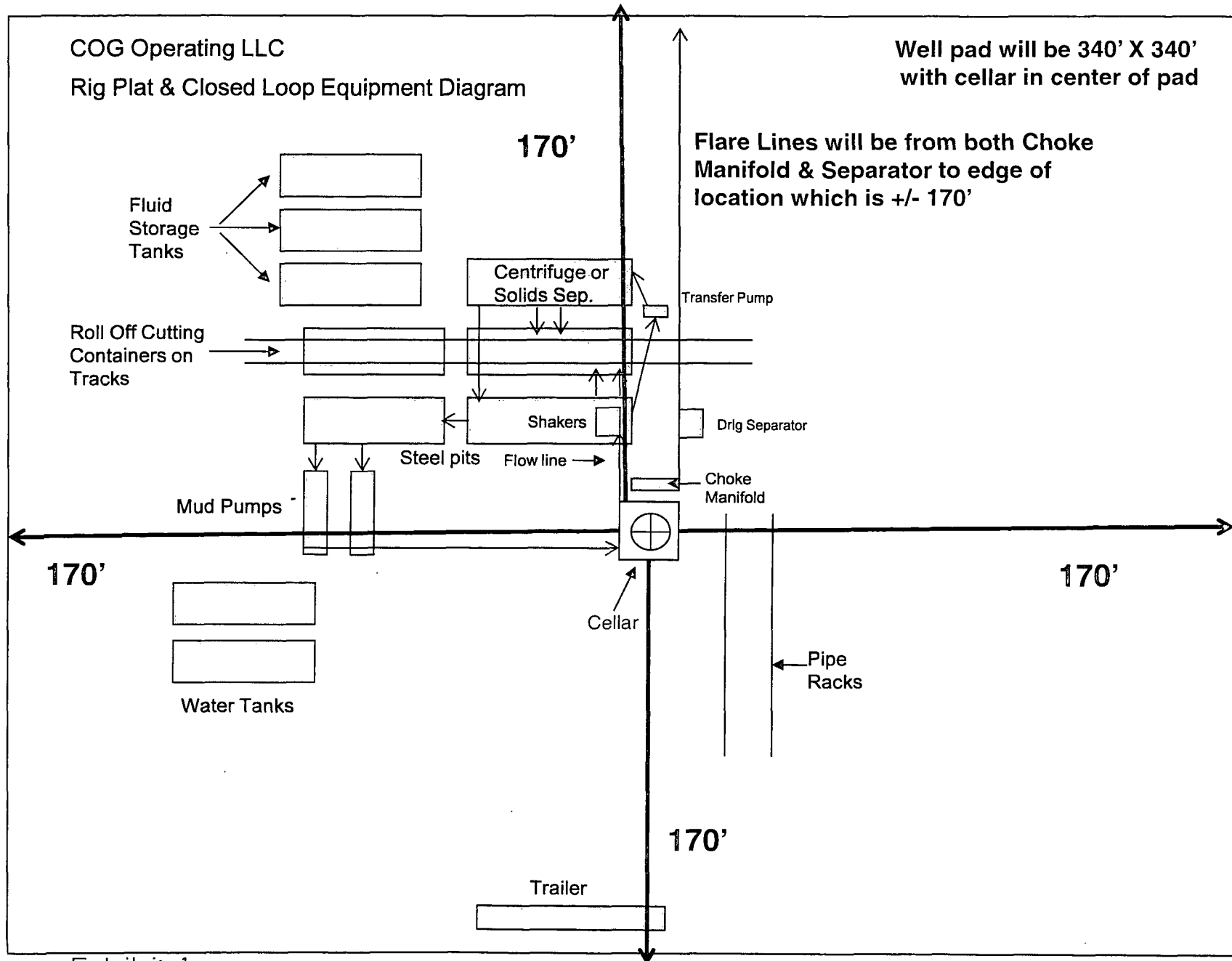


Exhibit 1

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