

Gunner 8 Federal 7H Sundry

30-025-41211

COG Request the following changes:

SHL change to 190' FSL & 2625' FEL of section 8
BHL change to 330' FNL & 2310' FEL of section 5

Intermediate Section:

Set approved 9-5/8" casing @ 5375' to insure all salt is covered
Base of Salt @ 5114', Lamar @ 5365'
Cmt in 1 stg with:
1000 sx approved lead slurry
250 sx approved tail slurry

Production Section:

See attached directional plan
Drill 8-3/4" vertical, curve and lateral to approx 19,939' MD / 9810' TVD
Run 5-1/2" 17# P110 LTC csg
Cmt in 1 stg with:
Lead: 600 sx Tuned Light Class H blend + Salt + Gilsonite + CF + CFR-3 @ 10.4 ppg/3.5 yield
Tail: 2500 sx 50:50:2 H + Salt + GasStop + CFR-3 @ 14.4/1.25 yield
Minimum tie back 500' inside 9-5/8"
25% excess on OH from EOL to EOC
40% excess on OH from EOC to 9-5/8" csg shoe

JUL 04 1995



COG Operating LLC
Project: Lea County, NM
Site: Gunner 8 Federal Com
Well: #7H
Wellbore: OH
Plan: Design #1 (#7H/OH)

Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	9422.5	0.00	0.00	9422.5	0.0	0.0	0.00	0.00	0.0	
3	10177.0	90.53	40.00	9900.0	369.2	309.8	12.00	40.00	379.1	
4	11229.0	90.53	357.92	9889.9	1341.8	643.9	4.00	-89.80	1362.1	
5	19939.1	90.53	357.92	9810.0	10045.8	327.6	0.00	0.00	10051.1	PBHL(Gunner8#7H)

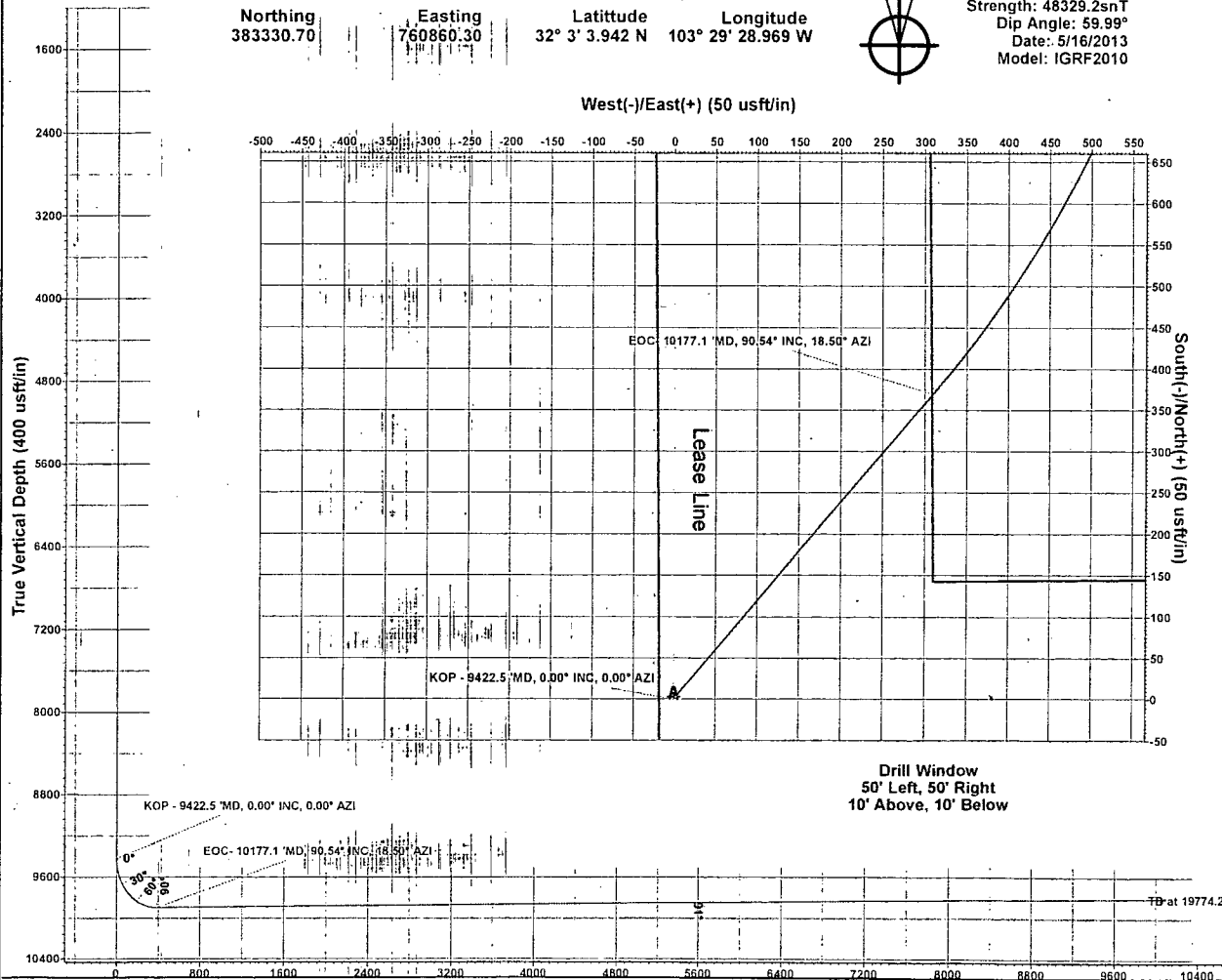
WELL DETAILS: #7H
Ground Elevation: 13352.5
RKB Elevation: Well1 @ 3378.5usft
Rig Name:

Northing 383330.70 Easting 760860.30 Latitude 32° 3' 3.942 N Longitude 103° 29' 28.969 W



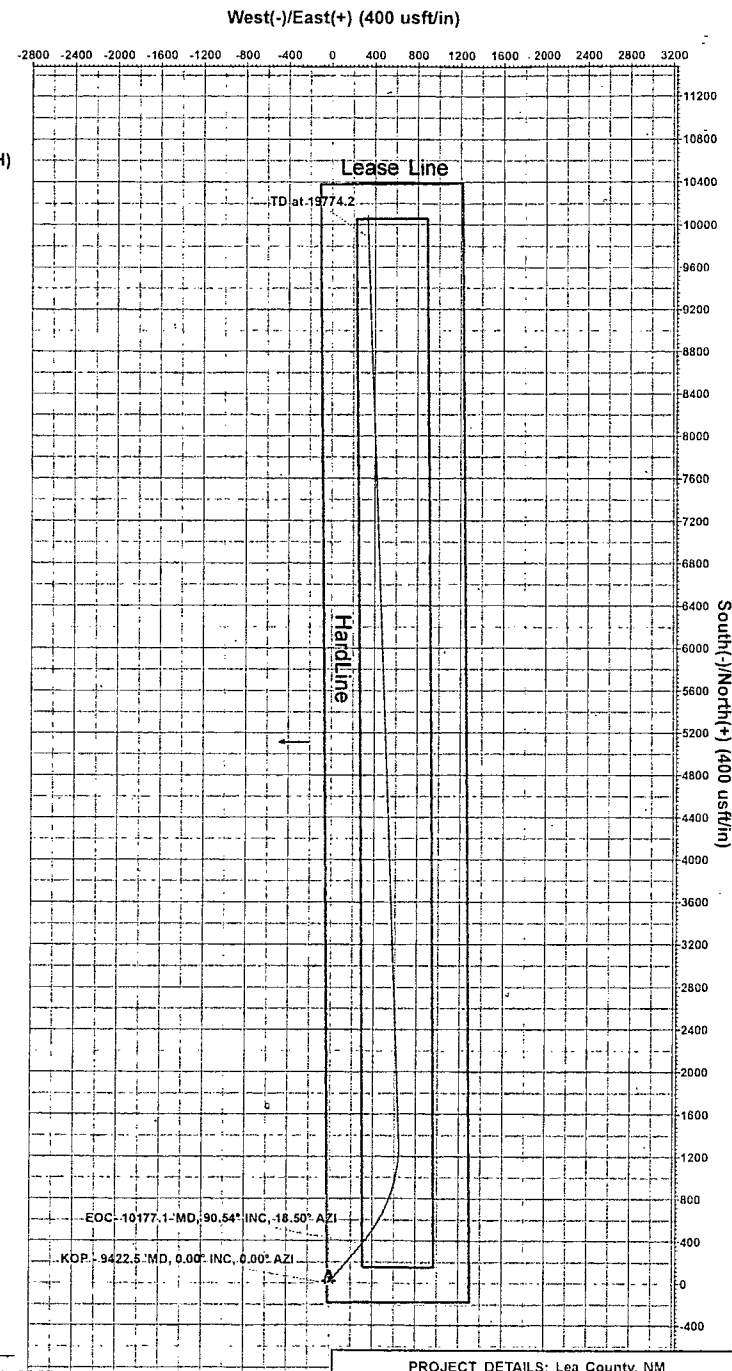
Azimuths to Grid North
True North: -0.45°
Magnetic North: 6.85°

Magnetic Field
Strength: 48329.2snT
Dip Angle: 59.99°
Date: 5/16/2013
Model: IGRF2010



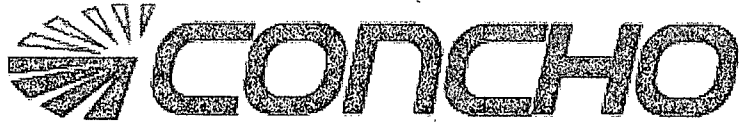
Vertical Section at 1.87° (400 usft/in)

Nexus Directional Solutions



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





COG Operating LLC

Lea County, NM

Gunner 8 Federal Com

#7H

OH

Plan: Design #1

Standard Planning Report

03 March, 2015



Wellplanning Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #7H
Company:	COG Operating LLC	TVD Reference:	Well1 @ 3378.5usft
Project:	Lea County, NM	MD Reference:	Well1 @ 3378.5usft
Site:	Gunner 8 Federal Com	North Reference:	Grid
Well:	#7H	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	Gunner 8 Federal Com		
Site Position:	Northings:	383,347.50 usft	Latitude: 32° 3' 3.934 N
From: Map	Easting:	763,104.70 usft	Longitude: 103° 29' 2.891 W
Position Uncertainty:	0.0 usft	Slot Radius: 13-3/16"	Grid Convergence: 0.45°

Well	#7H		
Well Position	+N/-S	-16.8 usft	Northings: 383,330.70 usft
	+E/-W	-2,244.4 usft	Easting: 760,860.30 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
			Ground Level: 3,352.5 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2010	5/16/2013	7.30
			Dip Angle (°)
			59.99
			Field Strength (nT)
			48,329

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 (°)
			1.87

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	
9,422.5	0.00	0.00	9,422.5	0.0	0.0	0.00	0.00	0.00	0.00	
10,177.0	90.53	40.00	9,900.0	369.2	309.8	12.00	12.00	0.00	40.00	
11,229.0	90.53	357.92	9,889.9	1,341.8	643.9	4.00	0.00	-4.00	-89.80	
19,939.1	90.53	357.92	9,810.0	10,045.8	327.6	0.00	0.00	0.00	0.00	PBHL(Gunner8#7H)



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Project:	Lea County, NM	MD Reference:	Well1 @ 3378.5usft
Site:	Gunner 8 Federal Com	North Reference:	Grid
Well:	#7H	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



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Company:	COG Operating LLC	TVD Reference:	Well1 @ 3378.5usft
Project:	Lea County, NM	MD Reference:	Well1 @ 3378.5usft
Site:	Gunner 8 Federal Com	North Reference:	Grid
Well:	#7H	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	
8,700.0	0.00	0.00	8,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,800.0	0.00	0.00	8,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,900.0	0.00	0.00	8,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,000.0	0.00	0.00	9,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,100.0	0.00	0.00	9,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,200.0	0.00	0.00	9,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,300.0	0.00	0.00	9,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,400.0	0.00	0.00	9,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,422.5	0.00	0.00	9,422.5	0.0	0.0	0.0	0.00	0.00	0.00	
KOP= 9422.5 MD=0.00° INC, 0.00° AZI										
9,425.0	0.30	40.00	9,425.0	0.0	0.0	0.0	12.00	12.00	0.00	
9,450.0	3.30	40.00	9,450.0	0.6	0.5	0.6	12.00	12.00	0.00	
9,475.0	6.30	40.00	9,474.9	2.2	1.9	2.3	12.00	12.00	0.00	
9,500.0	9.30	40.00	9,499.7	4.8	4.0	4.9	12.00	12.00	0.00	
9,525.0	12.30	40.00	9,524.2	8.4	7.0	8.6	12.00	12.00	0.00	
9,550.0	15.30	40.00	9,548.5	13.0	10.9	13.3	12.00	12.00	0.00	
9,575.0	18.30	40.00	9,572.4	18.5	15.5	19.0	12.00	12.00	0.00	
9,600.0	21.30	40.00	9,595.9	25.0	21.0	25.7	12.00	12.00	0.00	
9,625.0	24.30	40.00	9,619.0	32.4	27.2	33.3	12.00	12.00	0.00	
9,650.0	27.30	40.00	9,641.5	40.7	34.2	41.8	12.00	12.00	0.00	



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Site:	Gunner 8 Federal Com	North Reference:	Grid
Well:	#7H	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)
9,675.0	30.30	40.00	9,663.4	50.0	41.9	51.3	12.00	12.00	0.00
9,700.0	33.30	40.00	9,684.6	60.0	50.4	61.7	12.00	12.00	0.00
9,725.0	36.30	40.00	9,705.2	71.0	59.6	72.9	12.00	12.00	0.00
9,750.0	39.30	40.00	9,724.9	82.7	69.4	84.9	12.00	12.00	0.00
9,775.0	42.30	40.00	9,743.8	95.2	79.9	97.8	12.00	12.00	0.00
9,800.0	45.29	40.00	9,761.9	108.5	91.0	111.4	12.00	12.00	0.00
9,825.0	48.29	40.00	9,779.0	122.4	102.7	125.7	12.00	12.00	0.00
9,850.0	51.29	40.00	9,795.1	137.1	115.0	140.7	12.00	12.00	0.00
9,875.0	54.29	40.00	9,810.3	152.3	127.8	156.4	12.00	12.00	0.00
9,900.0	57.29	40.00	9,824.3	168.1	141.1	172.7	12.00	12.00	0.00
9,925.0	60.29	40.00	9,837.3	184.5	154.8	189.5	12.00	12.00	0.00
9,950.0	63.29	40.00	9,849.1	201.4	169.0	206.8	12.00	12.00	0.00
9,975.0	66.29	40.00	9,859.7	218.7	183.5	224.6	12.00	12.00	0.00
10,000.0	69.29	40.00	9,869.2	236.5	198.4	242.8	12.00	12.00	0.00
10,025.0	72.29	40.00	9,877.4	254.5	213.6	261.4	12.00	12.00	0.00
10,050.0	75.29	40.00	9,884.4	272.9	229.0	280.2	12.00	12.00	0.00
10,075.0	78.29	40.00	9,890.1	291.6	244.7	299.4	12.00	12.00	0.00
10,100.0	81.29	40.00	9,894.5	310.4	260.5	318.7	12.00	12.00	0.00
10,125.0	84.29	40.00	9,897.7	329.4	276.4	338.2	12.00	12.00	0.00
10,150.0	87.29	40.00	9,899.5	348.5	292.4	357.9	12.00	12.00	0.00
10,177.0	90.53	40.00	9,900.0	369.2	309.8	379.1	12.00	12.00	0.00
10,177.1	90.53	40.00	9,900.0	369.3	309.8	379.2	0.00	0.00	0.00
EOC- 10177.1 'MD, 90.54' INC, 18.50' AZI									
10,200.0	90.53	39.08	9,899.8	386.9	324.4	397.3	4.01	0.01	-4.01
10,300.0	90.54	35.08	9,898.8	466.7	384.7	479.0	4.00	0.01	-4.00
10,400.0	90.55	31.08	9,897.9	550.4	439.3	564.5	4.00	0.01	-4.00
10,500.0	90.56	27.08	9,896.9	637.8	487.9	653.4	4.00	0.01	-4.00
10,600.0	90.56	23.08	9,895.9	728.4	530.2	745.3	4.00	0.00	-4.00
10,700.0	90.57	19.08	9,894.9	821.7	566.2	839.7	4.00	0.00	-4.00
10,800.0	90.56	15.08	9,894.0	917.2	595.6	936.1	4.00	0.00	-4.00
10,900.0	90.56	11.08	9,893.0	1,014.6	618.2	1,034.2	4.00	0.00	-4.00
11,000.0	90.55	7.08	9,892.0	1,113.3	634.0	1,133.4	4.00	-0.01	-4.00
11,100.0	90.54	3.08	9,891.1	1,212.9	642.8	1,233.2	4.00	-0.01	-4.00
11,200.0	90.53	359.08	9,890.1	1,312.9	644.7	1,333.2	4.00	-0.01	-4.00
11,229.0	90.53	357.92	9,889.9	1,341.8	643.9	1,362.1	4.00	-0.01	-4.00
11,300.0	90.53	357.92	9,889.2	1,412.8	641.3	1,433.0	0.00	0.00	0.00
11,400.0	90.53	357.92	9,888.3	1,512.7	637.7	1,532.7	0.00	0.00	0.00
11,500.0	90.53	357.92	9,887.4	1,612.7	634.1	1,632.5	0.00	0.00	0.00
11,600.0	90.53	357.92	9,886.5	1,712.6	630.5	1,732.2	0.00	0.00	0.00
11,700.0	90.53	357.92	9,885.5	1,812.5	626.8	1,832.0	0.00	0.00	0.00
11,800.0	90.53	357.92	9,884.6	1,912.5	623.2	1,931.7	0.00	0.00	0.00
11,900.0	90.53	357.92	9,883.7	2,012.4	619.6	2,031.5	0.00	0.00	0.00
12,000.0	90.53	357.92	9,882.8	2,112.3	615.9	2,131.3	0.00	0.00	0.00
12,100.0	90.53	357.92	9,881.9	2,212.2	612.3	2,231.0	0.00	0.00	0.00
12,200.0	90.53	357.92	9,880.9	2,312.2	608.7	2,330.8	0.00	0.00	0.00
12,300.0	90.53	357.92	9,880.0	2,412.1	605.0	2,430.5	0.00	0.00	0.00
12,400.0	90.53	357.92	9,879.1	2,512.0	601.4	2,530.3	0.00	0.00	0.00
12,500.0	90.53	357.92	9,878.2	2,612.0	597.8	2,630.1	0.00	0.00	0.00
12,600.0	90.53	357.92	9,877.3	2,711.9	594.1	2,729.8	0.00	0.00	0.00
12,700.0	90.53	357.92	9,876.4	2,811.8	590.5	2,829.6	0.00	0.00	0.00
12,800.0	90.53	357.92	9,875.4	2,911.8	586.9	2,929.3	0.00	0.00	0.00
12,900.0	90.53	357.92	9,874.5	3,011.7	583.2	3,029.1	0.00	0.00	0.00
13,000.0	90.53	357.92	9,873.6	3,111.6	579.6	3,128.8	0.00	0.00	0.00
13,100.0	90.53	357.92	9,872.7	3,211.5	576.0	3,228.6	0.00	0.00	0.00



Wellplanning Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #7H
Company:	COG Operating LLC	TVD Reference:	Well1 @ 3378.5usft
Project:	Lea County, NM	MD Reference:	Well1 @ 3378.5usft
Site:	Gunner 8 Federal Com	North Reference:	Grid
Well:	#7H	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)	
13,200.0	90.53	357.92	9,871.8	3,311.5	572.3	3,328.4	0.00	0.00	0.00	
13,300.0	90.53	357.92	9,870.9	3,411.4	568.7	3,428.1	0.00	0.00	0.00	
13,400.0	90.53	357.92	9,869.9	3,511.3	565.1	3,527.9	0.00	0.00	0.00	
13,500.0	90.53	357.92	9,869.0	3,611.3	561.4	3,627.6	0.00	0.00	0.00	
13,600.0	90.53	357.92	9,868.1	3,711.2	557.8	3,727.4	0.00	0.00	0.00	
13,700.0	90.53	357.92	9,867.2	3,811.1	554.2	3,827.2	0.00	0.00	0.00	
13,800.0	90.53	357.92	9,866.3	3,911.0	550.6	3,926.9	0.00	0.00	0.00	
13,900.0	90.53	357.92	9,865.4	4,011.0	546.9	4,026.7	0.00	0.00	0.00	
14,000.0	90.53	357.92	9,864.4	4,110.9	543.3	4,126.4	0.00	0.00	0.00	
14,100.0	90.53	357.92	9,863.5	4,210.8	539.7	4,226.2	0.00	0.00	0.00	
14,200.0	90.53	357.92	9,862.6	4,310.8	536.0	4,325.9	0.00	0.00	0.00	
14,300.0	90.53	357.92	9,861.7	4,410.7	532.4	4,425.7	0.00	0.00	0.00	
14,400.0	90.53	357.92	9,860.8	4,510.6	528.8	4,525.5	0.00	0.00	0.00	
14,500.0	90.53	357.92	9,859.9	4,610.6	525.1	4,625.2	0.00	0.00	0.00	
14,600.0	90.53	357.92	9,858.9	4,710.5	521.5	4,725.0	0.00	0.00	0.00	
14,700.0	90.53	357.92	9,858.0	4,810.4	517.9	4,824.7	0.00	0.00	0.00	
14,800.0	90.53	357.92	9,857.1	4,910.3	514.2	4,924.5	0.00	0.00	0.00	
14,900.0	90.53	357.92	9,856.2	5,010.3	510.6	5,024.3	0.00	0.00	0.00	
15,000.0	90.53	357.92	9,855.3	5,110.2	507.0	5,124.0	0.00	0.00	0.00	
15,100.0	90.53	357.92	9,854.4	5,210.1	503.3	5,223.8	0.00	0.00	0.00	
15,200.0	90.53	357.92	9,853.4	5,310.1	499.7	5,323.5	0.00	0.00	0.00	
15,300.0	90.53	357.92	9,852.5	5,410.0	496.1	5,423.3	0.00	0.00	0.00	
15,400.0	90.53	357.92	9,851.6	5,509.9	492.4	5,523.0	0.00	0.00	0.00	
15,500.0	90.53	357.92	9,850.7	5,609.9	488.8	5,622.8	0.00	0.00	0.00	
15,600.0	90.53	357.92	9,849.8	5,709.8	485.2	5,722.6	0.00	0.00	0.00	
15,700.0	90.53	357.92	9,848.9	5,809.7	481.6	5,822.3	0.00	0.00	0.00	
15,800.0	90.53	357.92	9,847.9	5,909.6	477.9	5,922.1	0.00	0.00	0.00	
15,900.0	90.53	357.92	9,847.0	6,009.6	474.3	6,021.8	0.00	0.00	0.00	
16,000.0	90.53	357.92	9,846.1	6,109.5	470.7	6,121.6	0.00	0.00	0.00	
16,100.0	90.53	357.92	9,845.2	6,209.4	467.0	6,221.4	0.00	0.00	0.00	
16,200.0	90.53	357.92	9,844.3	6,309.4	463.4	6,321.1	0.00	0.00	0.00	
16,300.0	90.53	357.92	9,843.4	6,409.3	459.8	6,420.9	0.00	0.00	0.00	
16,400.0	90.53	357.92	9,842.4	6,509.2	456.1	6,520.6	0.00	0.00	0.00	
16,500.0	90.53	357.92	9,841.5	6,609.2	452.5	6,620.4	0.00	0.00	0.00	
16,600.0	90.53	357.92	9,840.6	6,709.1	448.9	6,720.1	0.00	0.00	0.00	
16,700.0	90.53	357.92	9,839.7	6,809.0	445.2	6,819.9	0.00	0.00	0.00	
16,800.0	90.53	357.92	9,838.8	6,908.9	441.6	6,919.7	0.00	0.00	0.00	
16,900.0	90.53	357.92	9,837.9	7,008.9	438.0	7,019.4	0.00	0.00	0.00	
17,000.0	90.53	357.92	9,836.9	7,108.8	434.3	7,119.2	0.00	0.00	0.00	
17,100.0	90.53	357.92	9,836.0	7,208.7	430.7	7,218.9	0.00	0.00	0.00	
17,200.0	90.53	357.92	9,835.1	7,308.7	427.1	7,318.7	0.00	0.00	0.00	
17,300.0	90.53	357.92	9,834.2	7,408.6	423.4	7,418.5	0.00	0.00	0.00	
17,400.0	90.53	357.92	9,833.3	7,508.5	419.8	7,518.2	0.00	0.00	0.00	
17,500.0	90.53	357.92	9,832.4	7,608.5	416.2	7,618.0	0.00	0.00	0.00	
17,600.0	90.53	357.92	9,831.4	7,708.4	412.5	7,717.7	0.00	0.00	0.00	
17,700.0	90.53	357.92	9,830.5	7,808.3	408.9	7,817.5	0.00	0.00	0.00	
17,800.0	90.53	357.92	9,829.6	7,908.2	405.3	7,917.2	0.00	0.00	0.00	
17,900.0	90.53	357.92	9,828.7	8,008.2	401.7	8,017.0	0.00	0.00	0.00	
18,000.0	90.53	357.92	9,827.8	8,108.1	398.0	8,116.8	0.00	0.00	0.00	
18,100.0	90.53	357.92	9,826.9	8,208.0	394.4	8,216.5	0.00	0.00	0.00	
18,200.0	90.53	357.92	9,825.9	8,308.0	390.8	8,316.3	0.00	0.00	0.00	
18,300.0	90.53	357.92	9,825.0	8,407.9	387.1	8,416.0	0.00	0.00	0.00	
18,400.0	90.53	357.92	9,824.1	8,507.8	383.5	8,515.8	0.00	0.00	0.00	
18,500.0	90.53	357.92	9,823.2	8,607.8	379.9	8,615.6	0.00	0.00	0.00	



Wellplanning Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #7H
Company:	COG Operating LLC	TVD Reference:	Well1 @ 3378.5usft
Project:	Lea County, NM	MD Reference:	Well1 @ 3378.5usft
Site:	Gunner 8 Federal Com	North Reference:	Grid
Well:	#7H	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)	
18,600.0	90.53	357.92	9,822.3	8,707.7	376.2	8,715.3	0.00	0.00	0.00	
18,700.0	90.53	357.92	9,821.4	8,807.6	372.6	8,815.1	0.00	0.00	0.00	
18,800.0	90.53	357.92	9,820.4	8,907.5	369.0	8,914.8	0.00	0.00	0.00	
18,900.0	90.53	357.92	9,819.5	9,007.5	365.3	9,014.6	0.00	0.00	0.00	
19,000.0	90.53	357.92	9,818.6	9,107.4	361.7	9,114.4	0.00	0.00	0.00	
19,100.0	90.53	357.92	9,817.7	9,207.3	358.1	9,214.1	0.00	0.00	0.00	
19,200.0	90.53	357.92	9,816.8	9,307.3	354.4	9,313.9	0.00	0.00	0.00	
19,300.0	90.53	357.92	9,815.9	9,407.2	350.8	9,413.6	0.00	0.00	0.00	
19,400.0	90.53	357.92	9,814.9	9,507.1	347.2	9,513.4	0.00	0.00	0.00	
19,500.0	90.53	357.92	9,814.0	9,607.0	343.5	9,613.1	0.00	0.00	0.00	
19,600.0	90.53	357.92	9,813.1	9,707.0	339.9	9,712.9	0.00	0.00	0.00	
19,700.0	90.53	357.92	9,812.2	9,806.9	336.3	9,812.7	0.00	0.00	0.00	
19,774.2	90.53	357.92	9,811.5	9,881.0	333.6	9,886.7	0.00	0.00	0.00	
TD at 19774.2										
19,800.0	90.53	357.92	9,811.3	9,906.8	332.7	9,912.4	0.00	0.00	0.00	
19,900.0	90.53	357.92	9,810.4	10,006.8	329.0	10,012.2	0.00	0.00	0.00	
19,939.1	90.53	357.92	9,810.0	10,045.8	327.6	10,051.1	0.00	0.00	0.00	
PBHL(Gunner8#7H)										

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										
PBHL(Gunner8#7H)	0.00	0.01	9,810.0	10,045.8	327.6	393,376.50	761,187.90	32° 4' 43.325 N	103° 29' 24.250 W	
- plan hits target center										
- Point										

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
9,422.5	9,422.5	0.0	0.0	KOP - 9422.5 'MD, 0.00° INC, 0.00° AZI	
10,177.1	9,900.0	457.1	152.9	EOC- 10177.1 'MD, 90.54° INC, 18.50° AZI	
19,774.2	9,810.0	10,045.8	227.6	TD at 19774.2	

PECOS DISTRICT CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NMNM-124664
WELL NAME & NO.:	Gunner 8 Federal 7H
SURFACE HOLE FOOTAGE:	0190' FSL & 2625' FEL
BOTTOM HOLE FOOTAGE:	0330' FNL & 2310' FEL Sec. 5, T. 26 S., R 34 E.
LOCATION:	Section 8, T. 26 S., R 34 E., NMPM
COUNTY:	Lea County, New Mexico

Special Requirements:

Communitization Agreement

A Communitization Agreement covering the acreage dedicated to this well must be filed for approval with the BLM. The effective date of the agreement shall be prior to any sales. In addition, the well sign shall include the surface and bottom hole lease numbers. If the Communitization Agreement number is known, it shall also be on the sign. If not, it shall be placed on the sign when the sign is replaced. **Sundry must be submitted to add "COM" to the name.**

I. DRILLING

A. DRILLING OPERATIONS REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

- a. Spudding well (minimum of 24 hours)
- b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
- c. BOPE tests (minimum of 4 hours)

☒ **Lea County**

Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240,
(575) 393-3612

1. **Although Hydrogen Sulfide has not been reported in the area, it is always a potential hazard. If Hydrogen Sulfide is encountered, report measured amounts and formations to the BLM.**
2. **Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval. If the drilling rig is removed without approval – an Incident of Non-Compliance will be written and will be a "Major" violation.**

3. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works is located, this does not include the dog house or stairway area.
4. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

B. CASING

Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.

Centralizers required on surface casing per Onshore Order 2.III.B.1.f.

Wait on cement (WOC) for Water Basin:

After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements.

No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.

Possible water and brine flows in the Salado, Castile, Delaware, and Bone Spring.

Possible lost circulation in the Delaware and Bone Springs formations.

Possible sulfur water flows from the Castile Group.

1. The **13-3/8** inch surface casing shall be set at approximately **790** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
 - b. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry.**
 - c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
 - d. If cement falls back, remedial cementing will be done prior to drilling out that string.
2. The minimum required fill of cement behind the **9-5/8** inch intermediate casing is:

☒ Cement to surface. If cement does not circulate see B.1.a, c-d above.

Centralizers required on horizontal leg, must be type for horizontal service and a minimum of one every other joint.

3. The minimum required fill of cement behind the **5-1/2** inch production casing is:

☒ Cement should tie-back at least 500 feet into previous casing string. Operator shall provide method of verification.

4. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

C. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.

2. **In the case where the only BOP installed is an annular preventer, it shall be tested to a minimum of 2000 psi (which may require upgrading to 3M or 5M annular).**
3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M) psi.**
4. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9-5/8** intermediate casing shoe shall be **3000 (3M) psi.**
5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
 - a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).
 - b. The tests shall be done by an independent service company utilizing a test plug **not a cup or J-packer**. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (18 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).
 - c. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.
 - d. The results of the test shall be reported to the appropriate BLM office.
 - e. All tests are required to be recorded on a calibrated test chart. **A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.**

- f. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

D. DRILL STEM TEST

If drill stem tests are performed, Onshore Order 2.III.D shall be followed.

E. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

JAM 062515