

**McVAY DRILLING COMPANY**

P.O. Box 2450
Hobbs, New Mexico 88241
(575) 397-3311
FAX: 39-DRILL

Well Name and Num: Gunner 8 Federal Com # 6H
Location: Sec 8, T26S, R34E
Operator: COG
Drilling Contractor: McVay Drilling Company

The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
1.30	398	2.80	6216	90.80	11405	92.20	11689
0.30	698	2.90	6594	91.50	11688	92.70	17161
0.20	770	2.80	6895	93.10	11971	91.00	17445
0.40	847	2.40	6973	91.30	12160	92.20	17537
2.40	1218	2.90	7361	91.10	12349	89.70	17726
2.30	1593	1.80	7728	90.60	12821	91.50	17820
1.90	1971	2.60	8105	91.70	13292	90.30	17914
1.10	2348	2.40	8438	89.60	13481	88.70	18197
1.50	2725	1.60	8860	90.80	13764	88.90	18575
2.10	3480	1.70	9238	90.80	13858	90.10	18669
1.40	3857	34.00	9584	90.60	14047	91.1	18763
2.50	4234	50.60	9772	90.40	14423	90.1	18669
2.90	4423	66.40	9961	91.30	14802	91.1	18763
1.00	4800	71.00	10055	92.70	15274	90.1	18952
1.10	5178	86.20	10338	89.70	15841	88.2	19046
1.90	5273	91.00	10744	89.90	15936	89.7	19518
2.70	5838	90.80	11027	92.90	16129	0.10	200

By: Mario A. Canino

Subscribed and sworn to before me this 12th day of August, 2015

Tina Flemens
Notary Public, Lea County, New Mexico



DEC 11 2015

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0.10	590						
0.40	770						
0.30	850						
1.10	1220						
2.10	1596						
2.30	1974						
1.80	2163						
2.30	2540						
1.60	2917						
3.30	3389						
1.90	3766						
2.60	4144						



COG Operating, LLC

Lea County, NM

Sec 8, T26S, R34E

Gunner 8 Federal COM #6H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

13 July, 2015



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal COM #6H
Project:	Lea County, NM	TVD Reference:	Well @ 3379.4usft (McVay 8)
Site:	Sec 8, T26S, R34E	MD Reference:	Well @ 3379.4usft (McVay 8)
Well:	Gunner 8 Federal COM #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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	Sec 8, T26S, R34E		
Site Position:		Northing:	383,330.50 usft
From:	Map	Easting:	760,820.40 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 3' 3.943 N
		Longitude:	103° 29' 29.432 W
		Grid Convergence:	0.45 °

Well	Gunner 8 Federal COM #6H		
Well Position	+N/-S	0.0 usft	Northing: 383,330.50 usft
	+E/-W	0.0 usft	Easting: 760,820.40 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 3' 3.943 N
		Longitude:	103° 29' 29.432 W
		Ground Level:	3,351.4 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2015	6/5/2015	7.12
			Dip Angle (°)
			59.94
			Field Strength (nT)
			48,053

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.0	0.0	0.0
			Direction (°)
			359.55

Survey Program	Date 7/13/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
398.0	770.0	GYRO (Wellbore #1)	Good_gyro
847.0	19,640.0	MWD (Wellbore #1)	MWD default
			Description
			Good Gyro
			MWD - Standard

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.0	0.00	0.00	0.0	0.0	0.0	383,330.50	760,820.40	32° 3' 3.943 N	103° 29' 29.432 W
398.0	1.30	327.00	398.0	3.8	-2.5	383,334.29	760,817.94	32° 3' 3.980 N	103° 29' 29.460 W
698.0	0.30	340.00	697.9	7.4	-4.6	383,337.88	760,815.82	32° 3' 4.016 N	103° 29' 29.485 W
770.0	0.20	322.00	769.9	7.7	-4.7	383,338.15	760,815.67	32° 3' 4.019 N	103° 29' 29.486 W
Tie In @ 770' MD / 770' TVD									
847.0	0.40	325.20	846.9	8.0	-5.0	383,338.48	760,815.44	32° 3' 4.022 N	103° 29' 29.489 W
1,032.0	2.50	282.50	1,031.9	9.4	-9.3	383,339.88	760,811.13	32° 3' 4.036 N	103° 29' 29.539 W
1,218.0	2.40	288.10	1,217.7	11.5	-16.9	383,341.97	760,803.47	32° 3' 4.058 N	103° 29' 29.628 W
1,405.0	2.60	262.80	1,404.5	12.2	-24.9	383,342.66	760,795.54	32° 3' 4.065 N	103° 29' 29.720 W
1,593.0	2.30	254.90	1,592.4	10.6	-32.7	383,341.14	760,787.66	32° 3' 4.051 N	103° 29' 29.812 W
1,782.0	2.10	250.80	1,781.2	8.5	-39.7	383,339.01	760,780.73	32° 3' 4.030 N	103° 29' 29.892 W

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Site:	Sec 8, T26S, R34E	MD Reference:	Well @ 3379.4usft (McVay 8)
Well:	Gunner 8 Federal COM #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,971.0	1.90	248.00	1,970.1	6.2	-45.8	383,336.70	760,774.56	32° 3' 4.008 N	103° 29' 29.964 W
2,159.0	1.60	248.40	2,158.0	4.1	-51.2	383,334.57	760,769.23	32° 3' 3.987 N	103° 29' 30.026 W
2,348.0	1.10	252.60	2,347.0	2.6	-55.4	383,333.05	760,765.04	32° 3' 3.972 N	103° 29' 30.075 W
2,537.0	1.70	270.20	2,535.9	2.0	-59.9	383,332.52	760,760.51	32° 3' 3.967 N	103° 29' 30.128 W
2,725.0	1.50	279.30	2,723.8	2.4	-65.1	383,332.93	760,755.29	32° 3' 3.972 N	103° 29' 30.188 W
2,914.0	2.70	274.40	2,912.7	3.2	-72.0	383,333.67	760,748.41	32° 3' 3.980 N	103° 29' 30.268 W
3,103.0	2.10	283.70	3,101.5	4.3	-79.8	383,334.83	760,740.61	32° 3' 3.992 N	103° 29' 30.359 W
3,291.0	1.30	290.60	3,289.4	5.9	-85.1	383,336.40	760,735.27	32° 3' 4.008 N	103° 29' 30.421 W
3,480.0	2.10	266.50	3,478.4	6.4	-90.6	383,336.94	760,729.80	32° 3' 4.013 N	103° 29' 30.484 W
3,668.0	1.90	280.70	3,666.2	6.8	-97.1	383,337.31	760,723.30	32° 3' 4.018 N	103° 29' 30.560 W
3,857.0	1.40	301.30	3,855.2	8.6	-102.1	383,339.09	760,718.25	32° 3' 4.036 N	103° 29' 30.618 W
4,046.0	1.90	301.50	4,044.1	11.4	-106.8	383,341.93	760,713.61	32° 3' 4.064 N	103° 29' 30.672 W
4,234.0	2.50	276.50	4,232.0	13.5	-113.5	383,344.02	760,706.88	32° 3' 4.085 N	103° 29' 30.750 W
4,423.0	2.90	281.30	4,420.7	14.9	-122.3	383,345.42	760,698.09	32° 3' 4.100 N	103° 29' 30.852 W
4,612.0	3.00	268.60	4,609.5	15.7	-131.9	383,346.24	760,688.46	32° 3' 4.109 N	103° 29' 30.964 W
4,800.0	1.00	257.70	4,797.4	15.3	-138.5	383,345.77	760,681.94	32° 3' 4.104 N	103° 29' 31.039 W
4,989.0	1.50	230.30	4,986.3	13.3	-142.0	383,343.84	760,678.42	32° 3' 4.086 N	103° 29' 31.080 W
5,178.0	1.10	226.80	5,175.3	10.5	-145.2	383,341.01	760,675.20	32° 3' 4.058 N	103° 29' 31.118 W
5,273.0	1.90	255.40	5,270.3	9.5	-147.4	383,339.99	760,673.01	32° 3' 4.048 N	103° 29' 31.144 W
5,461.0	1.00	267.40	5,458.2	8.6	-152.0	383,339.13	760,668.35	32° 3' 4.040 N	103° 29' 31.198 W
5,649.0	2.80	249.80	5,646.1	7.0	-158.0	383,337.47	760,662.40	32° 3' 4.024 N	103° 29' 31.267 W
5,838.0	2.70	252.60	5,834.9	4.0	-166.6	383,334.55	760,653.82	32° 3' 3.996 N	103° 29' 31.367 W
6,027.0	2.90	252.60	6,023.6	1.3	-175.4	383,331.79	760,645.01	32° 3' 3.969 N	103° 29' 31.470 W
6,216.0	2.80	253.70	6,212.4	-1.4	-184.4	383,329.06	760,636.02	32° 3' 3.943 N	103° 29' 31.574 W
6,405.0	2.70	252.30	6,401.2	-4.1	-193.0	383,326.41	760,627.35	32° 3' 3.917 N	103° 29' 31.675 W
6,594.0	2.90	253.10	6,590.0	-6.8	-201.9	383,323.67	760,618.53	32° 3' 3.891 N	103° 29' 31.778 W
6,782.0	2.80	257.30	6,777.7	-9.2	-210.9	383,321.28	760,609.50	32° 3' 3.868 N	103° 29' 31.883 W
6,973.0	2.80	260.30	6,968.5	-11.0	-220.0	383,319.47	760,600.35	32° 3' 3.851 N	103° 29' 31.990 W
7,162.0	2.90	260.70	7,157.3	-12.6	-229.3	383,317.92	760,591.09	32° 3' 3.836 N	103° 29' 32.098 W
7,351.0	2.90	259.30	7,346.0	-14.2	-238.7	383,316.25	760,581.67	32° 3' 3.820 N	103° 29' 32.207 W
7,539.0	2.00	266.10	7,533.8	-15.3	-246.7	383,315.15	760,573.72	32° 3' 3.810 N	103° 29' 32.299 W
7,728.0	1.80	262.40	7,722.7	-16.0	-252.9	383,314.53	760,567.49	32° 3' 3.804 N	103° 29' 32.372 W
7,917.0	1.80	261.00	7,911.7	-16.8	-258.8	383,313.67	760,561.62	32° 3' 3.796 N	103° 29' 32.440 W
8,105.0	2.60	276.70	8,099.5	-16.8	-265.9	383,313.71	760,554.47	32° 3' 3.797 N	103° 29' 32.523 W
8,294.0	2.30	269.00	8,288.3	-16.4	-274.0	383,314.14	760,546.42	32° 3' 3.802 N	103° 29' 32.617 W
8,483.0	2.40	262.30	8,477.2	-17.0	-281.7	383,313.55	760,538.70	32° 3' 3.797 N	103° 29' 32.707 W
8,671.0	1.90	281.40	8,665.1	-16.9	-288.7	383,313.64	760,531.75	32° 3' 3.798 N	103° 29' 32.787 W
8,860.0	1.60	270.90	8,854.0	-16.2	-294.4	383,314.30	760,526.04	32° 3' 3.805 N	103° 29' 32.854 W
9,049.0	1.80	265.80	9,042.9	-16.4	-300.0	383,314.12	760,520.44	32° 3' 3.804 N	103° 29' 32.919 W
9,238.0	1.70	265.40	9,231.8	-16.8	-305.7	383,313.68	760,514.68	32° 3' 3.800 N	103° 29' 32.986 W
9,300.0	2.70	312.20	9,293.8	-15.9	-307.7	383,314.59	760,512.68	32° 3' 3.809 N	103° 29' 33.009 W
9,347.0	8.10	341.90	9,340.5	-12.0	-309.6	383,318.48	760,510.83	32° 3' 3.848 N	103° 29' 33.030 W
9,395.0	14.40	350.20	9,387.6	-2.9	-311.6	383,327.59	760,508.77	32° 3' 3.938 N	103° 29' 33.053 W
9,442.0	19.40	2.10	9,432.6	10.7	-312.3	383,341.16	760,508.06	32° 3' 4.072 N	103° 29' 33.060 W
9,489.0	24.70	3.90	9,476.1	28.3	-311.4	383,358.77	760,509.01	32° 3' 4.246 N	103° 29' 33.047 W
9,536.0	29.40	3.00	9,518.0	49.6	-310.1	383,380.10	760,510.28	32° 3' 4.457 N	103° 29' 33.031 W
9,584.0	34.00	359.10	9,558.8	74.8	-309.7	383,405.30	760,510.69	32° 3' 4.707 N	103° 29' 33.024 W
9,631.0	37.30	357.50	9,597.0	102.2	-310.5	383,432.67	760,509.86	32° 3' 4.978 N	103° 29' 33.031 W
9,678.0	39.60	356.50	9,633.8	131.4	-312.1	383,461.86	760,508.33	32° 3' 5.267 N	103° 29' 33.046 W
9,687.1	40.63	356.65	9,640.7	137.2	-312.4	383,467.71	760,507.98	32° 3' 5.325 N	103° 29' 33.050 W
Crossed 330' Hard Line @ 9687' MD / 9641' TVD									
9,725.0	44.90	357.20	9,668.6	162.9	-313.8	383,493.40	760,506.60	32° 3' 5.579 N	103° 29' 33.063 W
9,772.0	50.60	358.20	9,700.1	197.6	-315.2	383,528.15	760,505.22	32° 3' 5.923 N	103° 29' 33.076 W
9,819.0	52.30	358.10	9,729.4	234.4	-316.4	383,564.88	760,504.03	32° 3' 6.286 N	103° 29' 33.087 W
9,867.0	57.50	358.60	9,757.0	273.6	-317.5	383,604.12	760,502.91	32° 3' 6.675 N	103° 29' 33.096 W

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,914.0	63.00	358.60	9,780.3	314.4	-318.5	383,644.90	760,501.91	32° 3' 7.078 N	103° 29' 33.104 W
9,961.0	66.40	358.60	9,800.4	356.9	-319.5	383,687.38	760,500.87	32° 3' 7.499 N	103° 29' 33.112 W
10,008.0	70.40	358.40	9,817.7	400.6	-320.7	383,731.05	760,499.73	32° 3' 7.931 N	103° 29' 33.122 W
10,055.0	71.00	359.00	9,833.3	444.9	-321.7	383,775.40	760,498.72	32° 3' 8.370 N	103° 29' 33.129 W
10,102.0	72.60	358.40	9,847.9	489.5	-322.7	383,820.03	760,497.71	32° 3' 8.812 N	103° 29' 33.137 W
10,149.0	77.40	358.10	9,860.1	534.9	-324.1	383,865.40	760,496.32	32° 3' 9.261 N	103° 29' 33.149 W
10,196.0	82.90	357.00	9,868.1	581.1	-326.1	383,911.64	760,494.34	32° 3' 9.719 N	103° 29' 33.168 W
10,244.0	85.50	356.70	9,873.0	628.8	-328.7	383,959.32	760,491.71	32° 3' 10.191 N	103° 29' 33.194 W
10,338.0	86.20	355.80	9,879.8	722.4	-334.8	384,052.87	760,485.58	32° 3' 11.117 N	103° 29' 33.257 W
10,460.0	88.00	0.00	9,886.0	844.1	-339.3	384,174.60	760,481.12	32° 3' 12.322 N	103° 29' 33.298 W
10,555.0	89.20	359.60	9,888.3	939.1	-339.6	384,269.57	760,480.79	32° 3' 13.262 N	103° 29' 33.293 W
10,649.0	90.10	0.00	9,888.9	1,033.1	-339.9	384,363.57	760,480.46	32° 3' 14.192 N	103° 29' 33.288 W
10,744.0	91.10	0.70	9,887.9	1,128.1	-339.4	384,458.56	760,481.04	32° 3' 15.132 N	103° 29' 33.273 W
10,838.0	91.00	1.00	9,886.1	1,222.0	-338.0	384,552.53	760,482.44	32° 3' 16.062 N	103° 29' 33.248 W
10,933.0	90.40	1.80	9,885.0	1,317.0	-335.6	384,647.50	760,484.76	32° 3' 17.001 N	103° 29' 33.213 W
11,027.0	90.80	0.70	9,884.0	1,411.0	-333.6	384,741.47	760,486.81	32° 3' 17.931 N	103° 29' 33.180 W
11,121.0	91.70	0.30	9,881.9	1,504.9	-332.8	384,835.44	760,487.63	32° 3' 18.861 N	103° 29' 33.162 W
11,216.0	91.30	0.70	9,879.5	1,599.9	-331.9	384,930.40	760,488.46	32° 3' 19.800 N	103° 29' 33.144 W
11,310.0	91.00	0.00	9,877.6	1,693.9	-331.4	385,024.38	760,489.03	32° 3' 20.730 N	103° 29' 33.129 W
11,405.0	90.80	0.00	9,876.1	1,788.9	-331.4	385,119.37	760,489.03	32° 3' 21.670 N	103° 29' 33.120 W
11,499.0	90.40	0.00	9,875.1	1,882.9	-331.4	385,213.36	760,489.03	32° 3' 22.600 N	103° 29' 33.112 W
11,593.0	91.10	0.00	9,873.9	1,976.9	-331.4	385,307.36	760,489.03	32° 3' 23.530 N	103° 29' 33.103 W
11,688.0	91.50	0.00	9,871.7	2,071.8	-331.4	385,402.33	760,489.03	32° 3' 24.470 N	103° 29' 33.095 W
11,782.0	91.70	359.30	9,869.1	2,165.8	-331.9	385,496.29	760,488.46	32° 3' 25.400 N	103° 29' 33.093 W
11,877.0	92.60	359.30	9,865.5	2,260.7	-333.1	385,591.22	760,487.30	32° 3' 26.340 N	103° 29' 33.098 W
11,971.0	93.10	359.60	9,860.8	2,354.6	-334.0	385,685.10	760,486.39	32° 3' 27.269 N	103° 29' 33.100 W
12,066.0	91.10	359.30	9,857.4	2,449.5	-334.9	385,780.02	760,485.48	32° 3' 28.208 N	103° 29' 33.102 W
12,160.0	91.30	359.60	9,855.4	2,543.5	-335.8	385,874.00	760,484.58	32° 3' 29.138 N	103° 29' 33.104 W
12,254.0	91.10	0.00	9,853.4	2,637.5	-336.1	385,967.98	760,484.25	32° 3' 30.068 N	103° 29' 33.099 W
12,349.0	91.10	0.30	9,851.6	2,732.5	-335.9	386,062.96	760,484.50	32° 3' 31.008 N	103° 29' 33.087 W
12,443.0	90.80	0.70	9,850.0	2,826.4	-335.1	386,156.94	760,485.32	32° 3' 31.938 N	103° 29' 33.069 W
12,537.0	90.40	359.30	9,849.1	2,920.4	-335.1	386,250.93	760,485.32	32° 3' 32.868 N	103° 29' 33.061 W
12,632.0	89.60	358.60	9,849.1	3,015.4	-336.8	386,345.92	760,483.58	32° 3' 33.808 N	103° 29' 33.073 W
12,726.0	89.00	358.60	9,850.2	3,109.4	-339.1	386,439.88	760,481.28	32° 3' 34.738 N	103° 29' 33.091 W
12,821.0	90.60	0.30	9,850.5	3,204.4	-340.0	386,534.87	760,480.37	32° 3' 35.678 N	103° 29' 33.093 W
12,915.0	89.90	0.00	9,850.1	3,298.4	-339.8	386,628.87	760,480.62	32° 3' 36.608 N	103° 29' 33.081 W
13,009.0	91.10	359.60	9,849.3	3,392.4	-340.1	386,722.86	760,480.29	32° 3' 37.538 N	103° 29' 33.077 W
13,104.0	91.10	0.00	9,847.5	3,487.3	-340.4	386,817.84	760,479.96	32° 3' 38.478 N	103° 29' 33.072 W
13,188.0	91.28	0.27	9,845.7	3,571.3	-340.2	386,901.83	760,480.16	32° 3' 39.309 N	103° 29' 33.062 W
Crossed 330' Hard Line @ 13188' MD / 9846' TVD									
13,198.0	91.30	0.30	9,845.5	3,581.3	-340.2	386,911.82	760,480.21	32° 3' 39.408 N	103° 29' 33.061 W
13,292.0	91.70	1.80	9,843.1	3,675.3	-338.5	387,005.77	760,481.93	32° 3' 40.338 N	103° 29' 33.032 W
13,387.0	91.30	0.00	9,840.6	3,770.2	-337.0	387,100.72	760,483.42	32° 3' 41.277 N	103° 29' 33.006 W
13,481.0	89.60	359.60	9,839.8	3,864.2	-337.3	387,194.72	760,483.09	32° 3' 42.207 N	103° 29' 33.001 W
13,575.0	90.10	359.60	9,840.1	3,958.2	-338.0	387,288.71	760,482.43	32° 3' 43.138 N	103° 29' 33.001 W
13,670.0	90.80	358.20	9,839.3	4,053.2	-339.8	387,383.69	760,480.61	32° 3' 44.078 N	103° 29' 33.013 W
13,764.0	90.80	358.60	9,838.0	4,147.1	-342.4	387,477.64	760,477.99	32° 3' 45.008 N	103° 29' 33.035 W
13,858.0	90.80	359.00	9,836.7	4,241.1	-344.4	387,571.61	760,476.02	32° 3' 45.938 N	103° 29' 33.049 W
13,953.0	91.30	359.30	9,835.0	4,336.1	-345.8	387,666.59	760,474.61	32° 3' 46.877 N	103° 29' 33.057 W
14,047.0	90.60	359.00	9,833.4	4,430.1	-347.2	387,760.56	760,473.21	32° 3' 47.808 N	103° 29' 33.065 W
14,082.5	90.34	358.70	9,833.1	4,465.6	-347.9	387,796.05	760,472.50	32° 3' 48.159 N	103° 29' 33.070 W
Crossed 330' Hard Line @ 14083' MD / 9833' TVD									
14,141.0	89.90	358.20	9,833.0	4,524.0	-349.5	387,854.53	760,470.92	32° 3' 48.738 N	103° 29' 33.083 W
14,235.0	90.40	358.60	9,832.7	4,618.0	-352.1	387,948.50	760,468.29	32° 3' 49.668 N	103° 29' 33.105 W
14,330.0	89.70	359.30	9,832.7	4,713.0	-353.8	388,043.48	760,466.55	32° 3' 50.608 N	103° 29' 33.117 W

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal COM #6H
Project:	Lea County, NM	TVD Reference:	Well @ 3379.4usft (McVay 8)
Site:	Sec 8, T26S, R34E	MD Reference:	Well @ 3379.4usft (McVay 8)
Well:	Gunner 8 Federal COM #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
14,424.0	90.40	359.60	9,832.6	4,807.0	-354.7	388,137.47	760,465.65	32° 3' 51.538 N	103° 29' 33.119 W	
14,518.0	91.30	359.60	9,831.2	4,901.0	-355.4	388,231.46	760,464.99	32° 3' 52.468 N	103° 29' 33.118 W	
14,613.0	94.50	0.30	9,826.4	4,995.8	-355.5	388,326.33	760,464.91	32° 3' 53.407 N	103° 29' 33.110 W	
14,707.0	91.70	357.90	9,821.3	5,089.7	-357.0	388,420.16	760,463.43	32° 3' 54.335 N	103° 29' 33.119 W	
14,802.0	91.30	357.90	9,818.8	5,184.6	-360.4	388,515.06	760,459.95	32° 3' 55.275 N	103° 29' 33.151 W	
14,896.0	90.80	357.50	9,817.1	5,278.5	-364.2	388,608.97	760,456.18	32° 3' 56.204 N	103° 29' 33.186 W	
14,990.0	90.60	357.20	9,815.9	5,372.4	-368.6	388,702.86	760,451.84	32° 3' 57.134 N	103° 29' 33.228 W	
15,085.0	93.80	0.30	9,812.3	5,467.2	-370.6	388,797.75	760,449.76	32° 3' 58.073 N	103° 29' 33.244 W	
15,179.0	93.30	0.70	9,806.5	5,561.1	-369.8	388,891.56	760,450.58	32° 3' 59.001 N	103° 29' 33.226 W	
15,274.0	92.70	0.30	9,801.5	5,655.9	-369.0	388,986.43	760,451.41	32° 3' 59.940 N	103° 29' 33.207 W	
15,368.0	91.30	359.60	9,798.2	5,749.9	-369.1	389,080.37	760,451.33	32° 4' 0.869 N	103° 29' 33.200 W	
15,463.0	90.60	358.60	9,796.6	5,844.8	-370.6	389,175.34	760,449.84	32° 4' 1.809 N	103° 29' 33.209 W	
15,557.0	90.40	359.00	9,795.8	5,938.8	-372.5	389,269.32	760,447.87	32° 4' 2.739 N	103° 29' 33.223 W	
15,652.0	90.40	359.60	9,795.2	6,033.8	-373.7	389,364.31	760,446.71	32° 4' 3.680 N	103° 29' 33.228 W	
15,746.0	89.70	359.60	9,795.1	6,127.8	-374.3	389,458.30	760,446.05	32° 4' 4.610 N	103° 29' 33.227 W	
15,841.0	89.70	0.00	9,795.6	6,222.8	-374.7	389,553.30	760,445.72	32° 4' 5.550 N	103° 29' 33.222 W	
15,936.0	89.90	1.00	9,795.9	6,317.8	-373.8	389,648.30	760,446.55	32° 4' 6.490 N	103° 29' 33.204 W	
16,030.0	89.60	0.70	9,796.3	6,411.8	-372.5	389,742.29	760,447.94	32° 4' 7.420 N	103° 29' 33.179 W	
16,125.0	92.20	359.30	9,794.8	6,506.8	-372.5	389,837.26	760,447.94	32° 4' 8.360 N	103° 29' 33.171 W	
16,219.0	92.90	359.30	9,790.6	6,600.7	-373.6	389,931.16	760,446.79	32° 4' 9.289 N	103° 29' 33.175 W	
16,313.0	92.90	359.30	9,785.9	6,694.5	-374.7	390,025.03	760,445.65	32° 4' 10.218 N	103° 29' 33.180 W	
16,408.0	92.00	358.60	9,781.8	6,789.4	-376.5	390,119.93	760,443.91	32° 4' 11.157 N	103° 29' 33.192 W	
16,502.0	91.70	358.20	9,778.8	6,883.3	-379.1	390,213.84	760,441.29	32° 4' 12.087 N	103° 29' 33.214 W	
16,596.0	91.80	357.90	9,775.9	6,977.2	-382.3	390,307.75	760,438.09	32° 4' 13.016 N	103° 29' 33.242 W	
16,689.0	92.20	357.90	9,772.7	7,070.1	-385.7	390,400.63	760,434.68	32° 4' 13.935 N	103° 29' 33.274 W	
16,783.0	90.30	359.00	9,770.6	7,164.1	-388.3	390,494.56	760,432.14	32° 4' 14.865 N	103° 29' 33.295 W	
16,879.0	90.60	358.60	9,769.9	7,260.0	-390.3	390,590.54	760,430.13	32° 4' 15.815 N	103° 29' 33.309 W	
16,974.0	91.10	359.00	9,768.5	7,355.0	-392.3	390,685.51	760,428.14	32° 4' 16.755 N	103° 29' 33.324 W	
17,068.0	92.00	359.00	9,765.9	7,449.0	-393.9	390,779.46	760,426.50	32° 4' 17.685 N	103° 29' 33.334 W	
17,162.0	92.70	359.20	9,762.1	7,542.9	-395.4	390,873.37	760,425.03	32° 4' 18.614 N	103° 29' 33.343 W	
17,257.0	89.90	359.60	9,759.9	7,637.8	-396.4	390,968.33	760,424.03	32° 4' 19.554 N	103° 29' 33.346 W	
17,351.0	90.80	359.30	9,759.3	7,731.8	-397.3	391,062.32	760,423.13	32° 4' 20.484 N	103° 29' 33.348 W	
17,445.0	91.00	359.00	9,757.9	7,825.8	-398.7	391,156.30	760,421.74	32° 4' 21.414 N	103° 29' 33.356 W	
17,537.0	92.20	358.60	9,755.3	7,917.7	-400.6	391,248.24	760,419.81	32° 4' 22.324 N	103° 29' 33.370 W	
17,632.0	91.70	0.30	9,752.1	8,012.7	-401.5	391,343.18	760,418.90	32° 4' 23.264 N	103° 29' 33.372 W	
17,726.0	89.70	359.30	9,750.9	8,106.7	-401.8	391,437.16	760,418.57	32° 4' 24.194 N	103° 29' 33.367 W	
17,820.0	91.50	359.60	9,749.9	8,200.7	-402.7	391,531.15	760,417.67	32° 4' 25.124 N	103° 29' 33.369 W	
17,914.0	90.30	0.30	9,748.5	8,294.6	-402.8	391,625.14	760,417.59	32° 4' 26.054 N	103° 29' 33.361 W	
18,008.0	88.70	0.00	9,749.3	8,388.6	-402.6	391,719.13	760,417.83	32° 4' 26.984 N	103° 29' 33.350 W	
18,103.0	88.20	0.30	9,751.8	8,483.6	-402.3	391,814.09	760,418.08	32° 4' 27.924 N	103° 29' 33.339 W	
18,197.0	88.70	1.00	9,754.4	8,577.6	-401.3	391,908.05	760,419.15	32° 4' 28.853 N	103° 29' 33.318 W	
18,292.0	90.30	1.40	9,755.2	8,672.5	-399.3	392,003.03	760,421.14	32° 4' 29.793 N	103° 29' 33.286 W	
18,386.0	88.90	0.00	9,755.9	8,766.5	-398.1	392,097.01	760,422.28	32° 4' 30.723 N	103° 29' 33.264 W	
18,480.0	88.90	359.60	9,757.7	8,860.5	-398.4	392,190.99	760,421.96	32° 4' 31.653 N	103° 29' 33.259 W	
18,575.0	88.90	359.30	9,759.5	8,955.5	-399.4	392,285.97	760,421.04	32° 4' 32.593 N	103° 29' 33.261 W	
18,669.0	90.10	359.30	9,760.3	9,049.5	-400.5	392,379.96	760,419.90	32° 4' 33.523 N	103° 29' 33.266 W	
18,763.0	91.10	359.30	9,759.3	9,143.4	-401.6	392,473.95	760,418.75	32° 4' 34.453 N	103° 29' 33.271 W	
18,858.0	91.00	0.00	9,757.6	9,238.4	-402.2	392,568.93	760,418.17	32° 4' 35.393 N	103° 29' 33.269 W	
18,952.0	90.10	0.30	9,756.7	9,332.4	-402.0	392,662.92	760,418.41	32° 4' 36.323 N	103° 29' 33.258 W	
19,046.0	88.20	359.30	9,758.1	9,426.4	-402.3	392,756.91	760,418.09	32° 4' 37.253 N	103° 29' 33.253 W	
19,141.0	87.60	358.60	9,761.6	9,521.3	-404.1	392,851.82	760,416.35	32° 4' 38.193 N	103° 29' 33.265 W	
19,235.0	88.30	358.60	9,764.9	9,615.2	-406.3	392,945.74	760,414.05	32° 4' 39.122 N	103° 29' 33.283 W	
19,329.0	89.40	359.00	9,766.8	9,709.2	-408.3	393,039.69	760,412.08	32° 4' 40.052 N	103° 29' 33.297 W	
19,424.0	89.70	359.00	9,767.6	9,804.2	-410.0	393,134.68	760,410.43	32° 4' 40.992 N	103° 29' 33.308 W	
19,518.0	89.70	359.00	9,768.1	9,898.2	-411.6	393,228.66	760,408.78	32° 4' 41.922 N	103° 29' 33.319 W	

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal COM #6H
Project:	Lea County, NM	TVD Reference:	Well @ 3379.4usft (McVay 8)
Site:	Sec 8, T26S, R34E	MD Reference:	Well @ 3379.4usft (McVay 8)
Well:	Gunner 8 Federal COM #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
19,640.0	89.70	359.00	9,768.7	10,020.1	-413.7	393,350.64	760,406.66	32° 4' 43.130 N	103° 29' 33.332 W
TD @ 19640' MD / 9769' TVD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
770.0	769.9	7.7	-4.7	Tie In @ 770' MD / 770' TVD
9,687.1	9,640.7	137.2	-312.4	Crossed 330' Hard Line @ 9687' MD / 9641' TVD
13,188.0	9,845.7	3,571.3	-340.2	Crossed 330' Hard Line @ 13188' MD / 9846' TVD
14,082.5	9,833.1	4,465.6	-347.9	Crossed 330' Hard Line @ 14083' MD / 9833' TVD
19,640.0	9,768.7	10,020.1	-413.7	TD @ 19640' MD / 9769' TVD

Checked By: _____ Approved By: _____ Date: _____