



OCD – HOBBS
04/16/2020
RECEIVED

COG Operating LLC

Lea County, NM (NAD27 NME)

Brot Helm Federal Com

704H

OH / 65033

Design: Surveys (McVay 8)

Standard Survey Report

17 October, 2019



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Project	Lea County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Brot Helm Federal Com		
Site Position:		Northing:	430,515.90 usft
From:	Map	Easting:	776,731.20 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 10' 49.593475 N
		Longitude:	103° 26' 20.027429 W
		Grid Convergence:	0.48 °

Well	704H		
Well Position	+N/-S	0.00 usft	Northing: 430,515.70 usft
	+E/-W	0.00 usft	Easting: 776,701.20 usft
Position Uncertainty	1.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 10' 49.593964 N
		Longitude:	103° 26' 20.376484 W
		Ground Level:	3,418.10 usft

Wellbore	OH / 65033		
Magnetics	Model Name	Sample Date	Declination (°)
	MVHD	9/12/2019	6.58
			Dip Angle (°)
			59.80
			Field Strength (nT)
			47,775.66658479

Design	Surveys (McVay 8)		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.00	0.00	0.00
			Direction (°)
			179.90

Survey Program	Date	10/17/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	12,003.00	Scientific Gyro Survey (OH / 65033)	Scientific Keeper	Scientific Drilling Intl. Standard Wireline Keeper
12,179.00	22,980.00	Gordon MWD Surveys - Corrected (OH / 6	MWD+IFR1+FDIR	OWSG MWD + IFR1 + FDIR Correction

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	0.43	188.43	100.00	-0.37	-0.06	0.37	0.43	0.43	0.00	
125.00	0.36	207.74	125.00	-0.53	-0.11	0.53	0.60	-0.28	77.24	
150.00	0.39	220.69	150.00	-0.67	-0.20	0.67	0.36	0.12	51.80	
175.00	0.39	209.32	175.00	-0.81	-0.29	0.81	0.31	0.00	-45.48	
200.00	0.44	199.28	200.00	-0.97	-0.37	0.97	0.35	0.20	-40.16	
225.00	0.44	199.49	225.00	-1.15	-0.43	1.15	0.01	0.00	0.84	
250.00	0.40	197.68	250.00	-1.33	-0.49	1.32	0.17	-0.16	-7.24	
275.00	0.57	192.30	274.99	-1.53	-0.54	1.53	0.70	0.68	-21.52	
300.00	0.58	186.35	299.99	-1.78	-0.58	1.78	0.24	0.04	-23.80	

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Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)
325.00	0.58	176.77	324.99	-2.03	-0.59	2.03	0.39	0.00	-38.32
350.00	0.62	162.51	349.99	-2.29	-0.54	2.28	0.62	0.16	-57.04
375.00	0.60	151.02	374.99	-2.53	-0.44	2.53	0.49	-0.08	-45.96
400.00	0.50	148.90	399.99	-2.74	-0.32	2.74	0.41	-0.40	-8.48
425.00	0.47	145.17	424.99	-2.91	-0.20	2.91	0.17	-0.12	-14.92
450.00	0.31	143.29	449.99	-3.05	-0.10	3.05	0.64	-0.64	-7.52
475.00	0.42	150.00	474.99	-3.19	-0.02	3.19	0.47	0.44	26.84
500.00	0.55	154.48	499.99	-3.37	0.08	3.37	0.54	0.52	17.92
525.00	0.47	152.09	524.98	-3.57	0.18	3.57	0.33	-0.32	-9.56
550.00	0.41	140.91	549.98	-3.73	0.28	3.73	0.42	-0.24	-44.72
575.00	0.34	135.13	574.98	-3.85	0.39	3.86	0.32	-0.28	-23.12
600.00	0.51	136.44	599.98	-3.99	0.52	3.99	0.68	0.68	5.24
625.00	0.59	108.28	624.98	-4.11	0.72	4.11	1.11	0.32	-112.64
650.00	0.49	115.48	649.98	-4.20	0.94	4.20	0.48	-0.40	28.80
675.00	0.71	127.14	674.98	-4.33	1.16	4.34	1.00	0.88	46.64
700.00	0.76	126.85	699.98	-4.53	1.41	4.53	0.20	0.20	-1.16
725.00	0.91	127.95	724.97	-4.75	1.70	4.75	0.60	0.60	4.40
750.00	0.93	125.30	749.97	-4.99	2.03	4.99	0.19	0.08	-10.60
775.00	0.95	119.49	774.97	-5.21	2.37	5.21	0.39	0.08	-23.24
800.00	0.98	120.43	799.96	-5.42	2.74	5.42	0.14	0.12	3.76
825.00	0.89	120.52	824.96	-5.62	3.09	5.63	0.36	-0.36	0.36
850.00	0.81	116.31	849.96	-5.80	3.41	5.81	0.41	-0.32	-16.84
875.00	0.74	128.91	874.96	-5.98	3.70	5.99	0.74	-0.28	50.40
900.00	0.81	129.06	899.95	-6.19	3.96	6.20	0.28	0.28	0.60
925.00	0.88	136.48	924.95	-6.44	4.23	6.45	0.52	0.28	29.68
950.00	1.04	144.28	949.95	-6.77	4.49	6.78	0.82	0.64	31.20
975.00	1.18	144.12	974.94	-7.16	4.78	7.17	0.56	0.56	-0.64
1,000.00	1.18	141.09	999.94	-7.57	5.09	7.58	0.25	0.00	-12.12
1,025.00	1.33	140.71	1,024.93	-7.99	5.44	8.00	0.60	0.60	-1.52
1,050.00	1.69	144.48	1,049.92	-8.52	5.83	8.53	1.49	1.44	15.08
1,075.00	1.96	148.05	1,074.91	-9.18	6.27	9.19	1.17	1.08	14.28
1,100.00	2.06	148.94	1,099.89	-9.93	6.73	9.94	0.42	0.40	3.56
1,125.00	1.99	149.94	1,124.88	-10.69	7.18	10.70	0.31	-0.28	4.00
1,150.00	1.89	152.99	1,149.86	-11.43	7.59	11.45	0.57	-0.40	12.20
1,175.00	1.97	157.41	1,174.85	-12.20	7.94	12.21	0.68	0.32	17.68
1,200.00	2.01	158.25	1,199.83	-13.00	8.27	13.02	0.20	0.16	3.36
1,225.00	2.17	155.51	1,224.82	-13.84	8.62	13.85	0.75	0.64	-10.96
1,250.00	2.08	152.63	1,249.80	-14.67	9.03	14.69	0.56	-0.36	-11.52
1,275.00	1.99	156.14	1,274.79	-15.47	9.41	15.49	0.61	-0.36	14.04
1,300.00	1.85	158.94	1,299.77	-16.25	9.73	16.26	0.67	-0.56	11.20
1,325.00	1.34	159.01	1,324.76	-16.90	9.98	16.91	2.04	-2.04	0.28
1,350.00	0.35	155.37	1,349.76	-17.24	10.12	17.26	3.96	-3.96	-14.56
1,375.00	0.15	44.48	1,374.76	-17.28	10.18	17.30	1.71	-0.80	-443.56

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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)
1,400.00	0.18	40.77	1,399.76	-17.23	10.22	17.25	0.13	0.12	-14.84
1,425.00	0.20	32.98	1,424.76	-17.16	10.27	17.18	0.13	0.08	-31.16
1,450.00	0.20	42.21	1,449.76	-17.10	10.33	17.11	0.13	0.00	36.92
1,475.00	0.24	56.83	1,474.76	-17.03	10.40	17.05	0.27	0.16	58.48
1,500.00	0.27	45.51	1,499.76	-16.97	10.49	16.98	0.23	0.12	-45.28
1,525.00	0.24	38.64	1,524.76	-16.88	10.56	16.90	0.17	-0.12	-27.48
1,550.00	0.20	48.06	1,549.76	-16.81	10.63	16.83	0.22	-0.16	37.68
1,575.00	0.15	64.86	1,574.76	-16.77	10.69	16.79	0.28	-0.20	67.20
1,600.00	0.13	49.68	1,599.76	-16.74	10.74	16.76	0.17	-0.08	-60.72
1,625.00	0.05	103.80	1,624.76	-16.72	10.77	16.74	0.43	-0.32	216.48
1,650.00	0.06	129.44	1,649.76	-16.73	10.79	16.75	0.11	0.04	102.56
1,675.00	0.14	104.38	1,674.76	-16.75	10.83	16.77	0.36	0.32	-100.24
1,700.00	0.10	95.11	1,699.76	-16.76	10.88	16.78	0.18	-0.16	-37.08
1,725.00	0.26	96.42	1,724.76	-16.77	10.96	16.79	0.64	0.64	5.24
1,750.00	0.33	66.41	1,749.76	-16.74	11.08	16.76	0.67	0.28	-120.04
1,775.00	0.47	47.92	1,774.76	-16.65	11.22	16.67	0.75	0.56	-73.96
1,800.00	0.50	50.00	1,799.75	-16.51	11.38	16.53	0.14	0.12	8.32
1,825.00	0.49	29.90	1,824.75	-16.34	11.52	16.36	0.69	-0.04	-80.40
1,850.00	0.39	27.54	1,849.75	-16.18	11.61	16.20	0.41	-0.40	-9.44
1,875.00	0.40	49.43	1,874.75	-16.04	11.72	16.06	0.60	0.04	87.56
1,900.00	0.55	24.97	1,899.75	-15.88	11.84	15.90	1.00	0.60	-97.84
1,925.00	0.41	22.26	1,924.75	-15.69	11.92	15.71	0.57	-0.56	-10.84
1,950.00	0.36	37.77	1,949.75	-15.54	12.00	15.56	0.46	-0.20	62.04
1,975.00	0.53	42.04	1,974.75	-15.39	12.13	15.42	0.69	0.68	17.08
2,000.00	0.47	33.87	1,999.75	-15.22	12.26	15.24	0.37	-0.24	-32.68
2,025.00	0.34	29.53	2,024.75	-15.07	12.36	15.10	0.53	-0.52	-17.36
2,050.00	0.39	45.36	2,049.75	-14.95	12.45	14.97	0.45	0.20	63.32
2,075.00	0.41	50.14	2,074.75	-14.83	12.58	14.85	0.16	0.08	19.12
2,100.00	0.48	46.70	2,099.75	-14.70	12.73	14.73	0.30	0.28	-13.76
2,125.00	0.51	38.67	2,124.75	-14.54	12.87	14.57	0.30	0.12	-32.12
2,150.00	0.59	27.58	2,149.74	-14.34	13.00	14.37	0.53	0.32	-44.36
2,175.00	0.56	21.92	2,174.74	-14.12	13.11	14.14	0.26	-0.12	-22.64
2,200.00	0.55	28.54	2,199.74	-13.90	13.21	13.92	0.26	-0.04	26.48
2,225.00	0.51	19.99	2,224.74	-13.69	13.31	13.71	0.35	-0.16	-34.20
2,250.00	0.48	10.14	2,249.74	-13.48	13.36	13.50	0.36	-0.12	-39.40
2,275.00	0.46	11.76	2,274.74	-13.28	13.40	13.30	0.10	-0.08	6.48
2,300.00	0.45	15.07	2,299.74	-13.09	13.45	13.11	0.11	-0.04	13.24
2,325.00	0.37	5.89	2,324.74	-12.91	13.48	12.93	0.41	-0.32	-36.72
2,350.00	0.33	9.56	2,349.74	-12.76	13.50	12.78	0.18	-0.16	14.68
2,375.00	0.28	30.21	2,374.74	-12.64	13.54	12.66	0.48	-0.20	82.60
2,400.00	0.30	31.10	2,399.74	-12.53	13.61	12.55	0.08	0.08	3.56
2,425.00	0.44	32.27	2,424.74	-12.39	13.69	12.41	0.56	0.56	4.68
2,450.00	0.44	34.31	2,449.73	-12.23	13.80	12.25	0.06	0.00	8.16

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2,475.00	0.45	36.03	2,474.73	-12.07	13.91	12.09	0.07	0.04	6.88	
2,500.00	0.45	24.31	2,499.73	-11.90	14.01	11.93	0.37	0.00	-46.88	
2,525.00	0.52	16.20	2,524.73	-11.70	14.08	11.73	0.39	0.28	-32.44	
2,550.00	0.45	6.50	2,549.73	-11.50	14.12	11.52	0.43	-0.28	-38.80	
2,575.00	0.99	353.15	2,574.73	-11.18	14.11	11.21	2.25	2.16	-53.40	
2,600.00	1.41	355.73	2,599.72	-10.66	14.06	10.69	1.69	1.68	10.32	
2,625.00	1.58	350.54	2,624.72	-10.02	13.98	10.04	0.87	0.68	-20.76	
2,650.00	1.41	354.11	2,649.71	-9.37	13.89	9.39	0.78	-0.68	14.28	
2,675.00	1.50	356.20	2,674.70	-8.74	13.84	8.76	0.42	0.36	8.36	
2,700.00	1.46	0.90	2,699.69	-8.09	13.82	8.12	0.51	-0.16	18.80	
2,725.00	1.55	0.93	2,724.68	-7.44	13.83	7.46	0.36	0.36	0.12	
2,750.00	1.61	359.91	2,749.67	-6.75	13.84	6.77	0.27	0.24	-4.08	
2,775.00	1.67	358.29	2,774.66	-6.03	13.83	6.06	0.30	0.24	-6.48	
2,800.00	1.63	359.16	2,799.65	-5.31	13.81	5.34	0.19	-0.16	3.48	
2,825.00	1.57	356.56	2,824.64	-4.62	13.79	4.64	0.38	-0.24	-10.40	
2,850.00	1.48	358.45	2,849.63	-3.95	13.76	3.97	0.41	-0.36	7.56	
2,875.00	1.51	5.93	2,874.62	-3.30	13.78	3.32	0.79	0.12	29.92	
2,900.00	1.55	7.25	2,899.62	-2.64	13.86	2.66	0.21	0.16	5.28	
2,925.00	1.58	3.48	2,924.61	-1.96	13.92	1.98	0.43	0.12	-15.08	
2,950.00	1.60	1.21	2,949.60	-1.26	13.95	1.29	0.26	0.08	-9.08	
2,975.00	1.39	6.73	2,974.59	-0.61	13.99	0.64	1.02	-0.84	22.08	
3,000.00	1.37	12.08	2,999.58	-0.02	14.09	0.05	0.52	-0.08	21.40	
3,025.00	1.53	9.70	3,024.57	0.60	14.21	-0.58	0.68	0.64	-9.52	
3,050.00	1.68	6.77	3,049.56	1.29	14.31	-1.27	0.68	0.60	-11.72	
3,075.00	1.54	10.86	3,074.55	1.99	14.42	-1.96	0.72	-0.56	16.36	
3,100.00	1.66	4.88	3,099.54	2.68	14.51	-2.65	0.82	0.48	-23.92	
3,125.00	1.68	4.61	3,124.53	3.40	14.57	-3.38	0.09	0.08	-1.08	
3,150.00	2.32	356.53	3,149.52	4.27	14.57	-4.25	2.79	2.56	-32.32	
3,175.00	2.56	354.41	3,174.50	5.33	14.48	-5.31	1.03	0.96	-8.48	
3,200.00	2.57	354.31	3,199.47	6.45	14.37	-6.42	0.04	0.04	-0.40	
3,225.00	2.55	354.17	3,224.45	7.56	14.26	-7.53	0.08	-0.08	-0.56	
3,250.00	2.48	357.65	3,249.42	8.65	14.18	-8.63	0.67	-0.28	13.92	
3,275.00	2.42	356.71	3,274.40	9.72	14.13	-9.70	0.29	-0.24	-3.76	
3,300.00	2.45	359.08	3,299.38	10.78	14.09	-10.76	0.42	0.12	9.48	
3,325.00	2.45	1.92	3,324.35	11.85	14.10	-11.83	0.49	0.00	11.36	
3,350.00	2.42	1.84	3,349.33	12.91	14.14	-12.89	0.12	-0.12	-0.32	
3,375.00	2.34	4.08	3,374.31	13.95	14.19	-13.92	0.49	-0.32	8.96	
3,400.00	2.32	4.70	3,399.29	14.96	14.27	-14.94	0.13	-0.08	2.48	
3,425.00	2.48	2.67	3,424.27	16.01	14.33	-15.98	0.72	0.64	-8.12	
3,450.00	2.39	4.46	3,449.24	17.07	14.40	-17.04	0.47	-0.36	7.16	
3,475.00	2.46	2.61	3,474.22	18.12	14.46	-18.10	0.42	0.28	-7.40	
3,500.00	2.46	0.20	3,499.20	19.19	14.49	-19.17	0.41	0.00	-9.64	
3,525.00	2.27	354.82	3,524.18	20.22	14.45	-20.20	1.17	-0.76	-21.52	
3,550.00	2.37	344.47	3,549.16	21.21	14.26	-21.19	1.72	0.40	-41.40	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)
3,575.00	2.44	339.57	3,574.13	22.21	13.94	-22.19	0.87	0.28	-19.60
3,600.00	2.52	339.84	3,599.11	23.23	13.57	-23.20	0.32	0.32	1.08
3,625.00	2.46	337.58	3,624.09	24.24	13.17	-24.21	0.46	-0.24	-9.04
3,650.00	2.34	334.81	3,649.07	25.20	12.75	-25.17	0.67	-0.48	-11.08
3,675.00	2.21	332.85	3,674.05	26.09	12.31	-26.06	0.61	-0.52	-7.84
3,700.00	2.09	332.83	3,699.03	26.92	11.88	-26.90	0.48	-0.48	-0.08
3,725.00	1.72	331.95	3,724.01	27.66	11.50	-27.64	1.48	-1.48	-3.52
3,750.00	1.68	335.38	3,749.00	28.32	11.17	-28.30	0.44	-0.16	13.72
3,775.00	1.63	338.45	3,773.99	28.99	10.89	-28.97	0.41	-0.20	12.28
3,800.00	1.62	337.02	3,798.98	29.64	10.62	-29.62	0.17	-0.04	-5.72
3,825.00	1.45	332.61	3,823.97	30.25	10.34	-30.23	0.83	-0.68	-17.64
3,850.00	1.58	335.78	3,848.97	30.84	10.05	-30.83	0.62	0.52	12.68
3,875.00	1.46	332.31	3,873.96	31.44	9.76	-31.42	0.60	-0.48	-13.88
3,900.00	1.89	321.02	3,898.95	32.04	9.35	-32.03	2.16	1.72	-45.16
3,925.00	2.45	303.63	3,923.93	32.66	8.65	-32.64	3.43	2.24	-69.56
3,950.00	2.70	302.49	3,948.90	33.27	7.71	-33.26	1.02	1.00	-4.56
3,975.00	2.96	301.87	3,973.87	33.93	6.66	-33.92	1.05	1.04	-2.48
4,000.00	2.74	295.36	3,998.84	34.52	5.57	-34.51	1.56	-0.88	-26.04
4,025.00	3.28	298.20	4,023.81	35.12	4.40	-35.11	2.24	2.16	11.36
4,050.00	3.29	295.54	4,048.77	35.77	3.13	-35.76	0.61	0.04	-10.64
4,075.00	3.44	294.58	4,073.72	36.39	1.80	-36.38	0.64	0.60	-3.84
4,100.00	3.45	291.39	4,098.68	36.97	0.41	-36.97	0.77	0.04	-12.76
4,125.00	3.51	290.82	4,123.63	37.52	-1.00	-37.52	0.28	0.24	-2.28
4,150.00	3.63	289.83	4,148.58	38.06	-2.46	-38.06	0.54	0.48	-3.96
4,175.00	3.65	288.92	4,173.53	38.59	-3.96	-38.59	0.24	0.08	-3.64
4,200.00	3.58	286.14	4,198.48	39.06	-5.46	-39.07	0.75	-0.28	-11.12
4,225.00	3.43	282.97	4,223.44	39.45	-6.94	-39.46	0.98	-0.60	-12.68
4,250.00	3.44	282.33	4,248.39	39.77	-8.40	-39.79	0.16	0.04	-2.56
4,275.00	3.43	281.87	4,273.35	40.09	-9.87	-40.11	0.12	-0.04	-1.84
4,300.00	3.44	280.91	4,298.30	40.38	-11.34	-40.40	0.23	0.04	-3.84
4,325.00	3.45	281.56	4,323.26	40.68	-12.81	-40.70	0.16	0.04	2.60
4,350.00	3.46	280.88	4,348.21	40.97	-14.29	-40.99	0.17	0.04	-2.72
4,375.00	3.32	279.44	4,373.17	41.23	-15.74	-41.26	0.66	-0.56	-5.76
4,400.00	3.27	279.74	4,398.13	41.47	-17.16	-41.50	0.21	-0.20	1.20
4,425.00	3.22	280.66	4,423.09	41.72	-18.55	-41.75	0.29	-0.20	3.68
4,450.00	3.36	282.86	4,448.04	42.01	-19.96	-42.05	0.75	0.56	8.80
4,475.00	3.13	292.27	4,473.00	42.44	-21.30	-42.47	2.32	-0.92	37.64
4,500.00	2.75	303.22	4,497.97	43.02	-22.43	-43.06	2.71	-1.52	43.80
4,525.00	2.42	306.86	4,522.95	43.67	-23.36	-43.71	1.47	-1.32	14.56
4,550.00	2.24	312.44	4,547.93	44.31	-24.14	-44.36	1.16	-0.72	22.32
4,575.00	2.14	316.31	4,572.91	44.98	-24.82	-45.02	0.71	-0.40	15.48
4,600.00	1.74	318.82	4,597.89	45.60	-25.40	-45.65	1.64	-1.60	10.04
4,625.00	1.43	321.64	4,622.88	46.14	-25.84	-46.18	1.28	-1.24	11.28

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)
4,650.00	1.19	331.05	4,647.88	46.61	-26.16	-46.65	1.29	-0.96	37.64
4,675.00	0.87	344.73	4,672.87	47.02	-26.33	-47.06	1.61	-1.28	54.72
4,700.00	0.59	17.22	4,697.87	47.32	-26.35	-47.37	1.96	-1.12	129.96
4,725.00	0.54	61.62	4,722.87	47.50	-26.21	-47.55	1.72	-0.20	177.60
4,750.00	0.73	67.91	4,747.87	47.62	-25.95	-47.66	0.81	0.76	25.16
4,775.00	0.77	62.36	4,772.87	47.76	-25.66	-47.80	0.33	0.16	-22.20
4,800.00	0.85	77.69	4,797.86	47.87	-25.33	-47.92	0.92	0.32	61.32
4,825.00	0.83	77.64	4,822.86	47.95	-24.97	-48.00	0.08	-0.08	-0.20
4,850.00	0.90	85.25	4,847.86	48.01	-24.60	-48.05	0.54	0.28	30.44
4,875.00	1.05	92.43	4,872.85	48.01	-24.17	-48.06	0.77	0.60	28.72
4,900.00	1.21	80.98	4,897.85	48.04	-23.68	-48.09	1.10	0.64	-45.80
4,925.00	1.50	81.66	4,922.84	48.13	-23.10	-48.17	1.16	1.16	2.72
4,950.00	1.83	81.44	4,947.83	48.24	-22.38	-48.28	1.32	1.32	-0.88
4,975.00	2.03	86.16	4,972.82	48.33	-21.54	-48.37	1.02	0.80	18.88
5,000.00	2.23	92.32	4,997.80	48.34	-20.62	-48.38	1.21	0.80	24.64
5,025.00	2.69	96.75	5,022.78	48.25	-19.55	-48.28	1.99	1.84	17.72
5,050.00	2.96	95.77	5,047.75	48.12	-18.32	-48.15	1.10	1.08	-3.92
5,075.00	3.09	97.50	5,072.71	47.96	-17.01	-47.99	0.64	0.52	6.92
5,100.00	3.13	96.60	5,097.68	47.80	-15.67	-47.83	0.25	0.16	-3.60
5,125.00	3.37	96.17	5,122.64	47.64	-14.26	-47.67	0.96	0.96	-1.72
5,150.00	3.57	99.50	5,147.59	47.43	-12.76	-47.46	1.14	0.80	13.32
5,175.00	3.59	101.67	5,172.54	47.15	-11.22	-47.17	0.55	0.08	8.68
5,200.00	3.64	102.62	5,197.49	46.81	-9.68	-46.83	0.31	0.20	3.80
5,225.00	3.78	101.24	5,222.44	46.48	-8.10	-46.49	0.66	0.56	-5.52
5,250.00	3.53	85.82	5,247.39	46.38	-6.53	-46.39	4.04	-1.00	-61.68
5,275.00	3.60	67.44	5,272.34	46.73	-5.03	-46.74	4.56	0.28	-73.52
5,300.00	3.71	65.27	5,297.29	47.37	-3.57	-47.38	0.71	0.44	-8.68
5,325.00	3.53	62.49	5,322.24	48.07	-2.16	-48.07	1.01	-0.72	-11.12
5,350.00	3.32	62.51	5,347.20	48.76	-0.83	-48.76	0.84	-0.84	0.08
5,375.00	3.21	62.07	5,372.15	49.42	0.43	-49.42	0.45	-0.44	-1.76
5,400.00	3.07	64.58	5,397.12	50.03	1.65	-50.03	0.78	-0.56	10.04
5,425.00	2.88	46.53	5,422.08	50.75	2.71	-50.75	3.81	-0.76	-72.20
5,450.00	3.29	16.72	5,447.05	51.87	3.37	-51.87	6.54	1.64	-119.24
5,475.00	3.59	6.53	5,472.00	53.34	3.67	-53.33	2.72	1.20	-40.76
5,500.00	3.54	3.13	5,496.96	54.89	3.80	-54.88	0.87	-0.20	-13.60
5,525.00	3.49	3.17	5,521.91	56.42	3.89	-56.41	0.20	-0.20	0.16
5,550.00	3.62	2.41	5,546.86	57.96	3.96	-57.96	0.55	0.52	-3.04
5,575.00	3.46	358.67	5,571.81	59.51	3.98	-59.50	1.12	-0.64	-14.96
5,600.00	3.60	2.55	5,596.77	61.04	3.99	-61.04	1.11	0.56	15.52
5,625.00	3.72	0.85	5,621.71	62.64	4.04	-62.63	0.65	0.48	-6.80
5,650.00	3.66	359.18	5,646.66	64.25	4.04	-64.24	0.49	-0.24	-6.68
5,675.00	3.68	359.32	5,671.61	65.85	4.02	-65.84	0.09	0.08	0.56
5,700.00	3.64	358.68	5,696.56	67.44	3.99	-67.44	0.23	-0.16	-2.56

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)	
5,725.00	3.46	359.99	5,721.51	68.99	3.97	-68.99	0.79	-0.72	5.24	
5,750.00	3.39	356.86	5,746.47	70.48	3.93	-70.48	0.80	-0.28	-12.52	
5,775.00	3.44	356.49	5,771.42	71.97	3.85	-71.96	0.22	0.20	-1.48	
5,800.00	3.43	352.85	5,796.38	73.46	3.71	-73.46	0.87	-0.04	-14.56	
5,825.00	3.64	338.70	5,821.33	74.94	3.33	-74.94	3.58	0.84	-56.60	
5,850.00	3.89	334.45	5,846.28	76.45	2.67	-76.44	1.50	1.00	-17.00	
5,875.00	3.80	331.25	5,871.22	77.94	1.91	-77.94	0.93	-0.36	-12.80	
5,900.00	3.86	334.41	5,896.17	79.42	1.15	-79.42	0.88	0.24	12.64	
5,925.00	3.90	333.99	5,921.11	80.95	0.41	-80.95	0.20	0.16	-1.68	
5,950.00	3.94	332.61	5,946.05	82.47	-0.36	-82.47	0.41	0.16	-5.52	
5,975.00	4.05	334.57	5,970.99	84.03	-1.13	-84.04	0.70	0.44	7.84	
6,000.00	3.80	329.82	5,995.93	85.55	-1.93	-85.55	1.64	-1.00	-19.00	
6,025.00	3.72	329.50	6,020.88	86.96	-2.76	-86.97	0.33	-0.32	-1.28	
6,050.00	3.66	330.61	6,045.82	88.36	-3.56	-88.36	0.37	-0.24	4.44	
6,075.00	3.67	330.65	6,070.77	89.75	-4.34	-89.76	0.04	0.04	0.16	
6,100.00	3.50	329.46	6,095.72	91.10	-5.12	-91.11	0.74	-0.68	-4.76	
6,125.00	3.70	330.42	6,120.68	92.46	-5.91	-92.47	0.84	0.80	3.84	
6,150.00	3.68	327.66	6,145.62	93.84	-6.74	-93.85	0.71	-0.08	-11.04	
6,175.00	3.56	329.92	6,170.57	95.19	-7.55	-95.20	0.75	-0.48	9.04	
6,200.00	3.60	328.07	6,195.53	96.53	-8.36	-96.54	0.49	0.16	-7.40	
6,225.00	3.42	329.09	6,220.48	97.84	-9.16	-97.85	0.76	-0.72	4.08	
6,250.00	3.35	330.11	6,245.43	99.11	-9.90	-99.13	0.37	-0.28	4.08	
6,275.00	3.51	329.18	6,270.39	100.40	-10.66	-100.42	0.68	0.64	-3.72	
6,300.00	3.42	327.67	6,295.34	101.69	-11.45	-101.71	0.51	-0.36	-6.04	
6,325.00	3.11	328.51	6,320.30	102.89	-12.20	-102.92	1.25	-1.24	3.36	
6,350.00	3.27	330.31	6,345.26	104.09	-12.91	-104.11	0.75	0.64	7.20	
6,375.00	3.26	330.12	6,370.22	105.33	-13.62	-105.35	0.06	-0.04	-0.76	
6,400.00	3.13	326.77	6,395.19	106.52	-14.35	-106.54	0.91	-0.52	-13.40	
6,425.00	2.99	325.51	6,420.15	107.62	-15.09	-107.65	0.62	-0.56	-5.04	
6,450.00	2.92	326.87	6,445.12	108.69	-15.81	-108.72	0.40	-0.28	5.44	
6,475.00	2.81	324.61	6,470.09	109.73	-16.51	-109.76	0.63	-0.44	-9.04	
6,500.00	2.86	328.70	6,495.05	110.76	-17.19	-110.79	0.83	0.20	16.36	
6,525.00	2.94	328.14	6,520.02	111.84	-17.85	-111.87	0.34	0.32	-2.24	
6,550.00	2.99	328.93	6,544.99	112.94	-18.53	-112.97	0.26	0.20	3.16	
6,575.00	3.02	328.17	6,569.95	114.06	-19.21	-114.09	0.20	0.12	-3.04	
6,600.00	2.93	326.25	6,594.92	115.15	-19.91	-115.18	0.54	-0.36	-7.68	
6,625.00	2.89	324.41	6,619.89	116.19	-20.63	-116.23	0.41	-0.16	-7.36	
6,650.00	2.90	325.09	6,644.86	117.22	-21.36	-117.26	0.14	0.04	2.72	
6,675.00	2.86	324.77	6,669.83	118.25	-22.08	-118.29	0.17	-0.16	-1.28	
6,700.00	2.85	324.39	6,694.79	119.27	-22.81	-119.31	0.09	-0.04	-1.52	
6,725.00	2.86	326.26	6,719.76	120.29	-23.51	-120.33	0.37	0.04	7.48	
6,750.00	2.89	325.49	6,744.73	121.33	-24.22	-121.37	0.20	0.12	-3.08	
6,775.00	2.79	325.25	6,769.70	122.35	-24.92	-122.39	0.40	-0.40	-0.96	
6,800.00	2.78	327.09	6,794.67	123.36	-25.60	-123.40	0.36	-0.04	7.36	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)
6,825.00	2.67	324.21	6,819.64	124.34	-26.27	-124.38	0.70	-0.44	-11.52
6,850.00	2.68	324.92	6,844.62	125.29	-26.94	-125.34	0.14	0.04	2.84
6,875.00	2.70	327.37	6,869.59	126.26	-27.60	-126.31	0.47	0.08	9.80
6,900.00	2.82	327.53	6,894.56	127.28	-28.24	-127.33	0.48	0.48	0.64
6,925.00	2.83	326.02	6,919.53	128.31	-28.92	-128.36	0.30	0.04	-6.04
6,950.00	2.87	326.32	6,944.50	129.34	-29.61	-129.39	0.17	0.16	1.20
6,975.00	2.79	324.44	6,969.47	130.36	-30.31	-130.41	0.49	-0.32	-7.52
7,000.00	2.77	324.11	6,994.44	131.34	-31.02	-131.39	0.10	-0.08	-1.32
7,025.00	2.71	325.07	7,019.41	132.31	-31.71	-132.37	0.30	-0.24	3.84
7,050.00	2.80	327.40	7,044.38	133.31	-32.38	-133.37	0.57	0.36	9.32
7,075.00	2.87	326.56	7,069.35	134.35	-33.05	-134.41	0.33	0.28	-3.36
7,100.00	2.90	324.68	7,094.32	135.39	-33.77	-135.45	0.40	0.12	-7.52
7,125.00	2.85	324.09	7,119.29	136.41	-34.50	-136.47	0.23	-0.20	-2.36
7,150.00	2.75	324.19	7,144.26	137.40	-35.21	-137.46	0.40	-0.40	0.40
7,175.00	2.85	327.64	7,169.23	138.41	-35.89	-138.47	0.78	0.40	13.80
7,200.00	2.86	328.76	7,194.20	139.47	-36.55	-139.53	0.23	0.04	4.48
7,225.00	2.87	327.63	7,219.17	140.53	-37.21	-140.59	0.23	0.04	-4.52
7,250.00	2.77	328.23	7,244.13	141.57	-37.86	-141.64	0.42	-0.40	2.40
7,275.00	2.80	327.58	7,269.11	142.60	-38.51	-142.67	0.17	0.12	-2.60
7,300.00	2.80	325.57	7,294.08	143.62	-39.18	-143.69	0.39	0.00	-8.04
7,325.00	2.84	326.27	7,319.05	144.64	-39.87	-144.71	0.21	0.16	2.80
7,350.00	2.81	325.92	7,344.01	145.66	-40.56	-145.73	0.14	-0.12	-1.40
7,375.00	2.67	322.11	7,368.99	146.63	-41.26	-146.70	0.92	-0.56	-15.24
7,400.00	2.61	322.15	7,393.96	147.54	-41.96	-147.61	0.24	-0.24	0.16
7,425.00	2.52	322.57	7,418.93	148.42	-42.65	-148.50	0.37	-0.36	1.68
7,450.00	2.39	326.47	7,443.91	149.29	-43.27	-149.37	0.85	-0.52	15.60
7,475.00	2.50	325.09	7,468.89	150.18	-43.87	-150.25	0.50	0.44	-5.52
7,500.00	2.49	324.18	7,493.87	151.06	-44.50	-151.14	0.16	-0.04	-3.64
7,525.00	2.22	318.96	7,518.84	151.87	-45.14	-151.95	1.38	-1.08	-20.88
7,550.00	2.08	319.40	7,543.83	152.58	-45.75	-152.66	0.56	-0.56	1.76
7,575.00	2.07	322.32	7,568.81	153.28	-46.32	-153.36	0.42	-0.04	11.68
7,600.00	2.12	324.99	7,593.79	154.02	-46.86	-154.10	0.44	0.20	10.68
7,625.00	2.14	323.94	7,618.78	154.77	-47.40	-154.85	0.18	0.08	-4.20
7,650.00	2.00	320.90	7,643.76	155.49	-47.95	-155.57	0.71	-0.56	-12.16
7,675.00	1.93	321.90	7,668.75	156.16	-48.49	-156.24	0.31	-0.28	4.00
7,700.00	1.85	320.34	7,693.73	156.80	-49.00	-156.89	0.38	-0.32	-6.24
7,725.00	1.84	321.09	7,718.72	157.42	-49.51	-157.51	0.10	-0.04	3.00
7,750.00	1.84	323.19	7,743.71	158.06	-50.01	-158.14	0.27	0.00	8.40
7,775.00	1.83	323.19	7,768.69	158.70	-50.49	-158.79	0.04	-0.04	0.00
7,800.00	1.93	326.04	7,793.68	159.37	-50.96	-159.45	0.55	0.40	11.40
7,825.00	1.98	321.22	7,818.66	160.05	-51.47	-160.14	0.69	0.20	-19.28
7,850.00	1.93	319.16	7,843.65	160.71	-52.01	-160.80	0.34	-0.20	-8.24
7,875.00	1.70	315.90	7,868.64	161.29	-52.54	-161.38	1.01	-0.92	-13.04

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)
7,900.00	1.85	316.03	7,893.63	161.85	-53.08	-161.94	0.60	0.60	0.52
7,925.00	1.74	314.29	7,918.61	162.40	-53.63	-162.50	0.49	-0.44	-6.96
7,950.00	1.67	317.31	7,943.60	162.94	-54.15	-163.03	0.46	-0.28	12.08
7,975.00	1.76	319.06	7,968.59	163.49	-54.65	-163.59	0.42	0.36	7.00
8,000.00	1.87	317.36	7,993.58	164.08	-55.18	-164.18	0.49	0.44	-6.80
8,025.00	1.82	312.08	8,018.57	164.65	-55.75	-164.75	0.71	-0.20	-21.12
8,050.00	1.65	313.87	8,043.55	165.17	-56.30	-165.26	0.71	-0.68	7.16
8,075.00	1.65	316.97	8,068.54	165.68	-56.81	-165.78	0.36	0.00	12.40
8,100.00	1.75	314.70	8,093.53	166.21	-57.33	-166.31	0.48	0.40	-9.08
8,125.00	1.62	312.57	8,118.52	166.72	-57.86	-166.82	0.58	-0.52	-8.52
8,150.00	1.56	312.88	8,143.51	167.19	-58.37	-167.29	0.24	-0.24	1.24
8,175.00	1.60	313.10	8,168.50	167.66	-58.87	-167.76	0.16	0.16	0.88
8,200.00	1.46	305.91	8,193.49	168.08	-59.38	-168.19	0.95	-0.56	-28.76
8,225.00	1.43	309.05	8,218.49	168.47	-59.88	-168.57	0.34	-0.12	12.56
8,250.00	1.36	312.78	8,243.48	168.87	-60.34	-168.97	0.46	-0.28	14.92
8,275.00	1.25	309.25	8,268.47	169.24	-60.77	-169.35	0.54	-0.44	-14.12
8,300.00	1.31	312.38	8,293.47	169.60	-61.20	-169.71	0.37	0.24	12.52
8,325.00	1.34	312.10	8,318.46	169.99	-61.62	-170.10	0.12	0.12	-1.12
8,350.00	1.29	309.76	8,343.45	170.37	-62.06	-170.48	0.29	-0.20	-9.36
8,375.00	1.35	316.91	8,368.45	170.76	-62.47	-170.87	0.70	0.24	28.60
8,400.00	1.37	310.27	8,393.44	171.17	-62.90	-171.28	0.64	0.08	-26.56
8,425.00	1.36	309.71	8,418.43	171.56	-63.36	-171.67	0.07	-0.04	-2.24
8,450.00	1.34	310.71	8,443.43	171.94	-63.81	-172.05	0.12	-0.08	4.00
8,475.00	1.38	307.51	8,468.42	172.31	-64.27	-172.42	0.34	0.16	-12.80
8,500.00	1.37	308.55	8,493.41	172.68	-64.74	-172.79	0.11	-0.04	4.16
8,525.00	1.30	307.66	8,518.40	173.04	-65.20	-173.15	0.29	-0.28	-3.56
8,550.00	1.15	313.25	8,543.40	173.38	-65.61	-173.50	0.77	-0.60	22.36
8,575.00	0.82	331.94	8,568.39	173.71	-65.88	-173.83	1.83	-1.32	74.76
8,600.00	0.72	337.05	8,593.39	174.02	-66.02	-174.13	0.48	-0.40	20.44
8,625.00	0.68	342.96	8,618.39	174.30	-66.13	-174.42	0.33	-0.16	23.64
8,650.00	0.62	347.40	8,643.39	174.58	-66.20	-174.69	0.31	-0.24	17.76
8,675.00	0.58	347.74	8,668.39	174.83	-66.25	-174.95	0.16	-0.16	1.36
8,700.00	0.65	347.38	8,693.39	175.09	-66.31	-175.21	0.28	0.28	-1.44
8,725.00	0.63	344.57	8,718.38	175.36	-66.38	-175.48	0.15	-0.08	-11.24
8,750.00	0.64	346.25	8,743.38	175.63	-66.45	-175.75	0.08	0.04	6.72
8,775.00	0.74	348.53	8,768.38	175.93	-66.52	-176.04	0.41	0.40	9.12
8,800.00	0.76	353.90	8,793.38	176.25	-66.57	-176.37	0.29	0.08	21.48
8,825.00	0.76	352.72	8,818.38	176.58	-66.60	-176.70	0.06	0.00	-4.72
8,850.00	0.78	349.89	8,843.37	176.91	-66.65	-177.03	0.17	0.08	-11.32
8,875.00	0.78	353.25	8,868.37	177.25	-66.70	-177.36	0.18	0.00	13.44
8,900.00	0.78	352.61	8,893.37	177.59	-66.75	-177.70	0.03	0.00	-2.56
8,925.00	0.79	355.13	8,918.37	177.93	-66.78	-178.04	0.14	0.04	10.08
8,950.00	0.77	4.53	8,943.37	178.26	-66.78	-178.38	0.52	-0.08	37.60

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,975.00	0.81	358.37	8,968.36	178.61	-66.78	-178.73	0.38	0.16	-24.64
9,000.00	0.83	10.74	8,993.36	178.96	-66.75	-179.08	0.71	0.08	49.48
9,025.00	0.88	9.30	9,018.36	179.33	-66.68	-179.45	0.22	0.20	-5.76
9,050.00	0.88	20.56	9,043.35	179.70	-66.58	-179.82	0.69	0.00	45.04
9,075.00	0.76	13.48	9,068.35	180.04	-66.48	-180.16	0.63	-0.48	-28.32
9,100.00	0.91	6.82	9,093.35	180.40	-66.42	-180.52	0.71	0.60	-26.64
9,125.00	1.00	17.43	9,118.35	180.80	-66.33	-180.92	0.79	0.36	42.44
9,150.00	0.95	21.78	9,143.34	181.21	-66.18	-181.32	0.36	-0.20	17.40
9,175.00	0.92	20.16	9,168.34	181.59	-66.04	-181.70	0.16	-0.12	-6.48
9,200.00	0.99	25.77	9,193.34	181.97	-65.88	-182.08	0.47	0.28	22.44
9,225.00	1.13	30.11	9,218.33	182.38	-65.66	-182.49	0.65	0.56	17.36
9,250.00	1.05	22.89	9,243.33	182.80	-65.45	-182.92	0.64	-0.32	-28.88
9,275.00	1.12	34.37	9,268.32	183.21	-65.22	-183.33	0.91	0.28	45.92
9,300.00	1.19	28.89	9,293.32	183.64	-64.95	-183.76	0.52	0.28	-21.92
9,325.00	1.08	27.81	9,318.31	184.08	-64.72	-184.19	0.45	-0.44	-4.32
9,350.00	1.22	28.31	9,343.31	184.52	-64.48	-184.63	0.56	0.56	2.00
9,375.00	1.27	29.48	9,368.30	185.00	-64.22	-185.11	0.22	0.20	4.68
9,400.00	1.30	34.13	9,393.30	185.47	-63.93	-185.58	0.43	0.12	18.60
9,425.00	1.25	36.68	9,418.29	185.93	-63.60	-186.04	0.30	-0.20	10.20
9,450.00	1.09	31.48	9,443.28	186.35	-63.32	-186.46	0.77	-0.64	-20.80
9,475.00	1.18	32.95	9,468.28	186.77	-63.05	-186.88	0.38	0.36	5.88
9,500.00	1.21	30.60	9,493.27	187.21	-62.78	-187.32	0.23	0.12	-9.40
9,525.00	1.14	41.54	9,518.27	187.62	-62.48	-187.73	0.94	-0.28	43.76
9,550.00	1.02	40.15	9,543.26	187.98	-62.17	-188.09	0.49	-0.48	-5.56
9,575.00	0.99	40.03	9,568.26	188.31	-61.89	-188.42	0.12	-0.12	-0.48
9,600.00	0.96	45.07	9,593.26	188.63	-61.60	-188.74	0.36	-0.12	20.16
9,625.00	0.96	37.88	9,618.25	188.94	-61.32	-189.05	0.48	0.00	-28.76
9,650.00	0.83	40.59	9,643.25	189.24	-61.08	-189.35	0.55	-0.52	10.84
9,675.00	0.89	47.15	9,668.25	189.51	-60.82	-189.62	0.46	0.24	26.24
9,700.00	0.81	53.98	9,693.24	189.75	-60.53	-189.85	0.52	-0.32	27.32
9,725.00	0.79	65.28	9,718.24	189.93	-60.23	-190.03	0.64	-0.08	45.20
9,750.00	0.77	60.70	9,743.24	190.08	-59.93	-190.18	0.26	-0.08	-18.32
9,775.00	0.67	64.95	9,768.24	190.22	-59.65	-190.33	0.45	-0.40	17.00
9,800.00	0.58	76.45	9,793.24	190.32	-59.39	-190.42	0.62	-0.36	46.00
9,825.00	0.53	78.46	9,818.23	190.37	-59.16	-190.47	0.21	-0.20	8.04
9,850.00	0.44	87.34	9,843.23	190.40	-58.95	-190.50	0.47	-0.36	35.52
9,875.00	0.37	106.74	9,868.23	190.38	-58.78	-190.48	0.61	-0.28	77.60
9,900.00	0.37	133.49	9,893.23	190.30	-58.64	-190.40	0.68	0.00	107.00
9,925.00	0.40	179.90	9,918.23	190.16	-58.58	-190.26	1.22	0.12	185.64
9,950.00	0.33	191.02	9,943.23	190.00	-58.60	-190.10	0.40	-0.28	44.48
9,975.00	0.44	189.56	9,968.23	189.83	-58.62	-189.93	0.44	0.44	-5.84
10,000.00	0.50	194.70	9,993.23	189.63	-58.67	-189.73	0.29	0.24	20.56
10,025.00	0.60	209.04	10,018.23	189.41	-58.76	-189.51	0.68	0.40	57.36
10,050.00	0.60	214.83	10,043.23	189.19	-58.90	-189.29	0.24	0.00	23.16

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)
10,075.00	0.62	225.26	10,068.23	188.99	-59.07	-189.09	0.45	0.08	41.72
10,100.00	0.65	239.97	10,093.23	188.82	-59.29	-188.92	0.66	0.12	58.84
10,125.00	0.74	248.90	10,118.22	188.69	-59.56	-188.80	0.56	0.36	35.72
10,150.00	0.81	250.12	10,143.22	188.57	-59.88	-188.68	0.29	0.28	4.88
10,175.00	0.85	262.88	10,168.22	188.49	-60.23	-188.60	0.75	0.16	51.04
10,200.00	0.90	278.99	10,193.22	188.50	-60.61	-188.60	1.00	0.20	64.44
10,225.00	1.06	289.25	10,218.21	188.61	-61.02	-188.71	0.95	0.64	41.04
10,250.00	1.22	307.18	10,243.21	188.84	-61.45	-188.95	1.56	0.64	71.72
10,275.00	1.78	308.83	10,268.20	189.25	-61.96	-189.35	2.25	2.24	6.60
10,300.00	2.12	309.92	10,293.18	189.79	-62.62	-189.90	1.37	1.36	4.36
10,325.00	2.60	314.11	10,318.16	190.48	-63.38	-190.59	2.04	1.92	16.76
10,350.00	2.90	320.21	10,343.13	191.36	-64.19	-191.47	1.67	1.20	24.40
10,375.00	3.28	318.92	10,368.10	192.38	-65.07	-192.50	1.55	1.52	-5.16
10,400.00	3.52	316.41	10,393.05	193.48	-66.07	-193.59	1.13	0.96	-10.04
10,425.00	3.67	314.29	10,418.00	194.59	-67.17	-194.71	0.80	0.60	-8.48
10,450.00	3.70	313.59	10,442.95	195.71	-68.33	-195.83	0.22	0.12	-2.80
10,475.00	3.68	314.32	10,467.90	196.83	-69.48	-196.95	0.20	-0.08	2.92
10,500.00	3.63	312.75	10,492.85	197.92	-70.64	-198.05	0.45	-0.20	-6.28
10,525.00	3.74	312.06	10,517.80	199.01	-71.83	-199.13	0.47	0.44	-2.76
10,550.00	3.65	310.48	10,542.75	200.07	-73.04	-200.20	0.54	-0.36	-6.32
10,575.00	3.74	311.94	10,567.69	201.13	-74.25	-201.26	0.52	0.36	5.84
10,600.00	3.74	313.09	10,592.64	202.23	-75.45	-202.36	0.30	0.00	4.60
10,625.00	3.78	312.98	10,617.59	203.35	-76.65	-203.48	0.16	0.16	-0.44
10,650.00	3.08	311.24	10,642.54	204.36	-77.76	-204.49	2.83	-2.80	-6.96
10,675.00	2.44	308.82	10,667.51	205.13	-78.68	-205.27	2.60	-2.56	-9.68
10,700.00	1.98	302.53	10,692.49	205.70	-79.46	-205.84	2.08	-1.84	-25.16
10,725.00	1.80	290.31	10,717.48	206.07	-80.19	-206.21	1.76	-0.72	-48.88
10,750.00	1.33	283.83	10,742.47	206.27	-80.84	-206.41	2.01	-1.88	-25.92
10,775.00	1.30	266.02	10,767.47	206.32	-81.40	-206.46	1.63	-0.12	-71.24
10,800.00	1.11	257.45	10,792.46	206.25	-81.92	-206.39	1.05	-0.76	-34.28
10,825.00	1.13	259.73	10,817.45	206.15	-82.40	-206.30	0.20	0.08	9.12
10,850.00	0.90	253.59	10,842.45	206.05	-82.83	-206.20	1.02	-0.92	-24.56
10,875.00	0.94	249.68	10,867.45	205.93	-83.21	-206.07	0.30	0.16	-15.64
10,900.00	0.91	250.96	10,892.44	205.79	-83.59	-205.94	0.15	-0.12	5.12
10,925.00	0.93	253.65	10,917.44	205.67	-83.97	-205.82	0.19	0.08	10.76
10,950.00	1.00	251.19	10,942.44	205.54	-84.38	-205.69	0.33	0.28	-9.84
10,975.00	1.07	258.69	10,967.43	205.43	-84.81	-205.57	0.61	0.28	30.00
11,000.00	1.02	257.63	10,992.43	205.33	-85.26	-205.48	0.21	-0.20	-4.24
11,025.00	0.96	254.49	11,017.43	205.23	-85.68	-205.38	0.32	-0.24	-12.56
11,050.00	0.91	251.74	11,042.42	205.11	-86.07	-205.26	0.27	-0.20	-11.00
11,075.00	1.11	257.73	11,067.42	205.00	-86.49	-205.15	0.90	0.80	23.96
11,100.00	1.13	263.29	11,092.41	204.92	-86.97	-205.07	0.44	0.08	22.24
11,125.00	1.01	265.52	11,117.41	204.87	-87.44	-205.02	0.51	-0.48	8.92

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)
11,150.00	1.13	271.40	11,142.41	204.86	-87.90	-205.01	0.65	0.48	23.52
11,175.00	0.98	272.38	11,167.40	204.87	-88.36	-205.03	0.60	-0.60	3.92
11,200.00	1.08	276.51	11,192.40	204.91	-88.81	-205.06	0.50	0.40	16.52
11,225.00	0.94	274.41	11,217.39	204.95	-89.25	-205.11	0.58	-0.56	-8.40
11,250.00	0.85	283.04	11,242.39	205.01	-89.64	-205.17	0.65	-0.36	34.52
11,275.00	0.75	272.19	11,267.39	205.06	-89.98	-205.21	0.72	-0.40	-43.40
11,300.00	0.93	282.65	11,292.38	205.11	-90.34	-205.27	0.94	0.72	41.84
11,325.00	0.73	279.56	11,317.38	205.18	-90.70	-205.34	0.82	-0.80	-12.36
11,350.00	1.05	273.75	11,342.38	205.22	-91.08	-205.38	1.33	1.28	-23.24
11,375.00	1.07	257.27	11,367.37	205.18	-91.54	-205.34	1.22	0.08	-65.92
11,400.00	1.27	264.33	11,392.37	205.11	-92.04	-205.27	0.98	0.80	28.24
11,425.00	1.32	257.66	11,417.36	205.02	-92.60	-205.18	0.63	0.20	-26.68
11,450.00	1.68	262.08	11,442.35	204.90	-93.24	-205.07	1.51	1.44	17.68
11,475.00	2.02	252.51	11,467.34	204.72	-94.03	-204.89	1.83	1.36	-38.28
11,500.00	1.98	255.33	11,492.33	204.48	-94.86	-204.65	0.42	-0.16	11.28
11,525.00	2.35	250.49	11,517.31	204.20	-95.76	-204.37	1.65	1.48	-19.36
11,550.00	2.29	252.39	11,542.29	203.88	-96.72	-204.05	0.39	-0.24	7.60
11,575.00	2.45	247.04	11,567.27	203.52	-97.69	-203.69	1.09	0.64	-21.40
11,600.00	2.52	252.54	11,592.24	203.14	-98.71	-203.32	0.99	0.28	22.00
11,625.00	2.55	247.51	11,617.22	202.77	-99.75	-202.94	0.90	0.12	-20.12
11,650.00	2.85	251.36	11,642.19	202.36	-100.85	-202.53	1.40	1.20	15.40
11,675.00	2.58	246.97	11,667.16	201.94	-101.96	-202.11	1.36	-1.08	-17.56
11,700.00	2.66	250.76	11,692.14	201.53	-103.02	-201.70	0.76	0.32	15.16
11,725.00	1.89	243.23	11,717.12	201.15	-103.94	-201.33	3.30	-3.08	-30.12
11,750.00	1.34	237.66	11,742.11	200.81	-104.55	-200.99	2.29	-2.20	-22.28
11,775.00	1.22	227.78	11,767.10	200.47	-105.00	-200.65	1.00	-0.48	-39.52
11,800.00	0.79	241.70	11,792.10	200.21	-105.35	-200.39	1.97	-1.72	55.68
11,825.00	1.13	248.64	11,817.09	200.04	-105.73	-200.22	1.43	1.36	27.76
11,850.00	1.07	267.48	11,842.09	199.94	-106.19	-200.12	1.46	-0.24	75.36
11,875.00	1.31	267.98	11,867.08	199.92	-106.71	-200.10	0.96	0.96	2.00
11,900.00	1.18	269.74	11,892.08	199.91	-107.25	-200.09	0.54	-0.52	7.04
11,925.00	1.63	278.04	11,917.07	199.96	-107.86	-200.14	1.97	1.80	33.20
11,950.00	1.20	280.53	11,942.06	200.05	-108.47	-200.24	1.74	-1.72	9.96
11,975.00	1.79	276.47	11,967.05	200.15	-109.12	-200.34	2.40	2.36	-16.24
12,000.00	1.78	271.43	11,992.04	200.20	-109.89	-200.39	0.63	-0.04	-20.16
12,003.00	1.87	271.88	11,995.04	200.20	-109.99	-200.39	3.04	3.00	15.00
12,179.00	2.05	294.94	12,170.94	201.62	-115.71	-201.83	0.46	0.10	13.10
First Gordon MWD Survey									
12,274.00	3.30	160.20	12,265.89	199.77	-116.33	-199.97	5.22	1.32	-141.83
12,306.00	9.27	156.46	12,297.68	196.53	-114.98	-196.73	18.69	18.66	-11.69
12,337.00	15.43	156.44	12,327.95	190.46	-112.34	-190.65	19.87	19.87	-0.06
12,369.00	21.10	155.71	12,358.33	181.30	-108.26	-181.49	17.73	17.72	-2.28
12,400.00	24.70	156.26	12,386.88	170.28	-103.36	-170.46	11.63	11.61	1.77

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,432.00	27.18	155.19	12,415.65	157.52	-97.60	-157.69	7.89	7.75	-3.34
12,451.00	29.59	156.54	12,432.37	149.28	-93.91	-149.44	13.13	12.69	7.13
FTP: 12451' MD									
12,463.00	31.12	157.30	12,442.72	143.70	-91.53	-143.86	13.13	12.74	6.30
12,495.00	35.20	164.37	12,469.52	127.18	-85.85	-127.33	17.55	12.75	22.09
12,527.00	38.86	167.66	12,495.06	108.48	-81.22	-108.62	13.00	11.44	10.28
12,558.00	41.45	168.44	12,518.75	88.92	-77.08	-89.06	8.51	8.35	2.52
12,589.00	42.02	168.94	12,541.88	68.69	-73.04	-68.82	2.13	1.84	1.61
12,621.00	44.45	170.70	12,565.20	47.12	-69.17	-47.24	8.48	7.59	5.50
12,652.00	49.37	172.59	12,586.37	24.72	-65.90	-24.84	16.48	15.87	6.10
12,683.00	53.18	176.14	12,605.76	0.67	-63.54	-0.78	15.19	12.29	11.45
12,714.00	55.70	178.90	12,623.79	-24.52	-62.46	24.41	10.89	8.13	8.90
12,746.00	58.74	179.08	12,641.11	-51.42	-61.99	51.31	9.51	9.50	0.56
12,778.00	60.54	178.57	12,657.29	-79.02	-61.42	78.92	5.79	5.63	-1.59
12,809.00	62.94	178.37	12,671.96	-106.32	-60.69	106.21	7.76	7.74	-0.65
12,841.00	64.51	178.15	12,686.13	-135.00	-59.82	134.89	4.94	4.91	-0.69
12,872.00	65.94	178.58	12,699.12	-163.13	-59.02	163.03	4.78	4.61	1.39
12,904.00	68.64	178.76	12,711.47	-192.64	-58.33	192.54	8.45	8.44	0.56
12,935.00	72.15	179.49	12,721.87	-221.84	-57.89	221.73	11.54	11.32	2.35
12,967.00	73.74	181.19	12,731.26	-252.43	-58.07	252.32	7.11	4.97	5.31
12,999.00	75.09	180.69	12,739.86	-283.24	-58.58	283.14	4.48	4.22	-1.56
13,030.00	80.28	179.82	12,746.47	-313.52	-58.71	313.42	16.96	16.74	-2.81
13,125.00	91.80	177.12	12,753.02	-408.09	-56.17	407.99	12.45	12.13	-2.84
13,221.00	88.84	176.71	12,752.48	-503.94	-51.00	503.85	3.11	-3.08	-0.43
13,316.00	88.02	177.92	12,755.08	-598.80	-46.56	598.71	1.54	-0.86	1.27
13,411.00	88.19	179.99	12,758.23	-693.72	-44.82	693.64	2.19	0.18	2.18
13,506.00	84.59	179.57	12,764.21	-788.52	-44.46	788.44	3.82	-3.79	-0.44
13,601.00	84.57	180.29	12,773.18	-883.09	-44.35	883.01	0.75	-0.02	0.76
13,705.00	88.55	180.15	12,779.42	-986.88	-44.74	986.80	3.83	3.83	-0.13
13,799.00	87.05	179.00	12,783.03	-1,080.81	-44.05	1,080.73	2.01	-1.60	-1.22
13,893.00	86.82	178.44	12,788.05	-1,174.65	-41.95	1,174.57	0.64	-0.24	-0.60
13,987.00	85.65	180.70	12,794.23	-1,268.44	-41.25	1,268.36	2.70	-1.24	2.40
14,081.00	85.43	179.56	12,801.54	-1,362.15	-41.46	1,362.08	1.23	-0.23	-1.21
14,176.00	85.29	179.81	12,809.22	-1,456.84	-40.94	1,456.76	0.30	-0.15	0.26
14,271.00	90.00	183.53	12,813.13	-1,551.67	-43.71	1,551.59	6.32	4.96	3.92
14,366.00	87.57	181.88	12,815.14	-1,646.53	-48.19	1,646.45	3.09	-2.56	-1.74
14,461.00	89.62	183.85	12,817.47	-1,741.38	-52.94	1,741.28	2.99	2.16	2.07
14,555.00	92.75	185.24	12,815.53	-1,835.05	-60.38	1,834.94	3.64	3.33	1.48
14,649.00	93.08	182.43	12,810.74	-1,928.71	-66.66	1,928.59	3.01	0.35	-2.99
14,744.00	93.22	178.79	12,805.52	-2,023.54	-67.67	2,023.42	3.83	0.15	-3.83
14,839.00	85.79	175.33	12,806.34	-2,118.33	-62.80	2,118.22	8.63	-7.82	-3.64
14,933.00	84.03	175.29	12,814.68	-2,211.64	-55.15	2,211.55	1.87	-1.87	-0.04
15,027.00	84.70	175.79	12,823.91	-2,304.91	-47.88	2,304.82	0.89	0.71	0.53
15,122.00	86.16	178.03	12,831.48	-2,399.46	-42.77	2,399.38	2.81	1.54	2.36

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)	
15,217.00	91.68	181.82	12,833.27	-2,494.39	-42.65	2,494.31	7.05	5.81	3.99	
15,312.00	90.52	180.16	12,831.45	-2,589.35	-44.29	2,589.27	2.13	-1.22	-1.75	
15,373.00	91.78	180.96	12,830.22	-2,650.33	-44.89	2,650.25	2.45	2.07	1.31	
15,468.00	91.67	180.17	12,827.36	-2,745.29	-45.82	2,745.20	0.84	-0.12	-0.83	
15,562.00	91.47	180.59	12,824.79	-2,839.25	-46.45	2,839.16	0.49	-0.21	0.45	
15,657.00	90.94	181.88	12,822.79	-2,934.20	-48.50	2,934.11	1.47	-0.56	1.36	
15,751.00	91.70	182.79	12,820.63	-3,028.10	-52.32	3,028.00	1.26	0.81	0.97	
15,846.00	90.58	182.68	12,818.74	-3,122.97	-56.86	3,122.87	1.18	-1.18	-0.12	
15,941.00	91.19	181.04	12,817.27	-3,217.90	-59.94	3,217.79	1.84	0.64	-1.73	
16,036.00	91.31	179.89	12,815.20	-3,312.88	-60.71	3,312.77	1.22	0.13	-1.21	
16,131.00	92.88	180.04	12,811.72	-3,407.81	-60.65	3,407.70	1.66	1.65	0.16	
16,226.00	91.31	179.34	12,808.25	-3,502.74	-60.14	3,502.63	1.81	-1.65	-0.74	
16,320.00	90.91	177.15	12,806.43	-3,596.67	-57.26	3,596.57	2.37	-0.43	-2.33	
16,414.00	91.11	176.99	12,804.77	-3,690.54	-52.46	3,690.44	0.27	0.21	-0.17	
16,508.00	91.98	176.73	12,802.24	-3,784.36	-47.31	3,784.27	0.97	0.93	-0.28	
16,604.00	92.36	177.79	12,798.60	-3,880.18	-42.72	3,880.10	1.17	0.40	1.10	
16,700.00	90.62	180.29	12,796.11	-3,976.12	-41.12	3,976.05	3.17	-1.81	2.60	
16,795.00	90.04	180.79	12,795.56	-4,071.12	-42.01	4,071.04	0.81	-0.61	0.53	
16,890.00	90.12	179.91	12,795.43	-4,166.11	-42.59	4,166.03	0.93	0.08	-0.93	
16,984.00	91.41	180.45	12,794.17	-4,260.10	-42.89	4,260.02	1.49	1.37	0.57	
17,079.00	91.24	180.84	12,791.97	-4,355.07	-43.96	4,354.99	0.45	-0.18	0.41	
17,173.00	92.19	180.18	12,789.16	-4,449.02	-44.79	4,448.94	1.23	1.01	-0.70	
17,267.00	88.80	179.59	12,788.35	-4,543.01	-44.60	4,542.92	3.66	-3.61	-0.63	
17,396.00	88.38	180.28	12,791.52	-4,671.97	-44.46	4,671.88	0.63	-0.33	0.53	
17,491.00	90.18	180.43	12,792.72	-4,766.95	-45.05	4,766.87	1.90	1.89	0.16	
17,585.00	90.87	178.42	12,791.86	-4,860.94	-44.10	4,860.85	2.26	0.73	-2.14	
17,681.00	88.10	176.95	12,792.72	-4,956.84	-40.23	4,956.77	3.27	-2.89	-1.53	
17,775.00	87.87	177.14	12,796.02	-5,050.66	-35.38	5,050.59	0.32	-0.24	0.20	
17,869.00	90.34	178.96	12,797.49	-5,144.58	-32.19	5,144.52	3.26	2.63	1.94	
17,964.00	90.96	179.47	12,796.41	-5,239.57	-30.88	5,239.51	0.85	0.65	0.54	
18,058.00	89.47	178.14	12,796.06	-5,333.54	-28.92	5,333.48	2.12	-1.59	-1.41	
18,153.00	90.31	178.25	12,796.24	-5,428.49	-25.93	5,428.44	0.89	0.88	0.12	
18,247.00	88.74	178.25	12,797.02	-5,522.44	-23.06	5,522.40	1.67	-1.67	0.00	
18,342.00	91.09	180.25	12,797.16	-5,617.42	-21.82	5,617.38	3.25	2.47	2.11	
18,436.00	88.38	182.18	12,797.60	-5,711.39	-23.81	5,711.34	3.54	-2.88	2.05	
18,531.00	88.96	179.20	12,799.80	-5,806.35	-24.95	5,806.29	3.19	0.61	-3.14	
18,625.00	88.72	178.12	12,801.71	-5,900.30	-22.76	5,900.25	1.18	-0.26	-1.15	
18,719.00	86.07	177.54	12,805.98	-5,994.13	-19.20	5,994.08	2.89	-2.82	-0.62	
18,814.00	86.87	178.11	12,811.83	-6,088.88	-15.60	6,088.84	1.03	0.84	0.60	
18,909.00	89.74	180.13	12,814.64	-6,183.81	-14.15	6,183.77	3.69	3.02	2.13	
19,004.00	90.63	178.82	12,814.33	-6,278.80	-13.28	6,278.77	1.67	0.94	-1.38	
19,098.00	90.28	182.13	12,813.59	-6,372.78	-14.05	6,372.75	3.54	-0.37	3.52	
19,193.00	89.10	178.42	12,814.10	-6,467.76	-14.51	6,467.73	4.10	-1.24	-3.91	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)	
19,287.00	92.26	178.85	12,812.98	-6,561.72	-12.27	6,561.68	3.39	3.36	0.46	
19,381.00	93.22	179.23	12,808.49	-6,655.59	-10.70	6,655.56	1.10	1.02	0.40	
19,476.00	93.66	179.87	12,802.79	-6,750.42	-9.95	6,750.39	0.82	0.46	0.67	
19,569.00	92.70	179.76	12,797.63	-6,843.27	-9.65	6,843.25	1.04	-1.03	-0.12	
19,664.00	89.94	179.40	12,795.44	-6,938.24	-8.96	6,938.21	2.93	-2.91	-0.38	
19,758.00	88.15	178.35	12,797.01	-7,032.20	-7.11	7,032.18	2.21	-1.90	-1.12	
19,852.00	89.44	178.20	12,798.99	-7,126.13	-4.28	7,126.12	1.38	1.37	-0.16	
19,947.00	89.79	177.57	12,799.62	-7,221.07	-0.78	7,221.05	0.76	0.37	-0.66	
20,042.00	92.52	177.21	12,797.71	-7,315.94	3.55	7,315.94	2.90	2.87	-0.38	
20,136.00	89.37	178.46	12,796.16	-7,409.85	7.10	7,409.85	3.61	-3.35	1.33	
20,232.00	92.79	179.03	12,794.35	-7,505.79	9.20	7,505.80	3.61	3.56	0.59	
20,291.00	90.32	178.61	12,792.75	-7,564.75	10.41	7,564.76	4.25	-4.19	-0.71	
20,386.00	90.83	179.01	12,791.80	-7,659.73	12.39	7,659.74	0.68	0.54	0.42	
20,480.00	90.51	178.68	12,790.70	-7,753.70	14.28	7,753.71	0.49	-0.34	-0.35	
20,575.00	90.60	179.06	12,789.78	-7,848.68	16.15	7,848.69	0.41	0.09	0.40	
20,669.00	90.89	179.24	12,788.55	-7,942.66	17.55	7,942.68	0.36	0.31	0.19	
20,764.00	88.16	178.28	12,789.34	-8,037.62	19.60	8,037.65	3.05	-2.87	-1.01	
20,859.00	91.21	179.86	12,789.86	-8,132.60	21.15	8,132.62	3.62	3.21	1.66	
20,953.00	89.78	182.39	12,789.05	-8,226.56	19.30	8,226.59	3.09	-1.52	2.69	
21,047.00	89.37	181.15	12,789.75	-8,320.52	16.40	8,320.53	1.39	-0.44	-1.32	
21,142.00	89.61	180.60	12,790.60	-8,415.50	14.95	8,415.51	0.63	0.25	-0.58	
21,236.00	91.34	181.36	12,789.82	-8,509.48	13.34	8,509.49	2.01	1.84	0.81	
21,331.00	90.77	180.54	12,788.07	-8,604.45	11.76	8,604.46	1.05	-0.60	-0.86	
21,425.00	90.24	180.19	12,787.24	-8,698.44	11.16	8,698.45	0.68	-0.56	-0.37	
21,519.00	89.87	180.02	12,787.15	-8,792.44	10.99	8,792.45	0.43	-0.39	-0.18	
21,614.00	91.85	181.35	12,785.72	-8,887.42	9.86	8,887.42	2.51	2.08	1.40	
21,708.00	90.68	181.14	12,783.65	-8,981.37	7.82	8,981.37	1.26	-1.24	-0.22	
21,803.00	91.30	179.78	12,782.01	-9,076.35	7.05	9,076.35	1.57	0.65	-1.43	
21,898.00	90.24	179.17	12,780.73	-9,171.34	7.92	9,171.34	1.29	-1.12	-0.64	
21,993.00	89.94	177.71	12,780.58	-9,266.30	10.51	9,266.30	1.57	-0.32	-1.54	
22,088.00	90.61	179.45	12,780.12	-9,361.26	12.86	9,361.27	1.96	0.71	1.83	
22,182.00	90.07	179.16	12,779.57	-9,455.25	14.00	9,455.26	0.65	-0.57	-0.31	
22,277.00	88.94	178.50	12,780.39	-9,550.23	15.94	9,550.24	1.38	-1.19	-0.69	
22,370.00	89.98	178.99	12,781.26	-9,643.20	17.98	9,643.22	1.24	1.12	0.53	
22,462.00	90.02	178.55	12,781.26	-9,735.18	19.96	9,735.20	0.48	0.04	-0.48	
22,554.00	91.01	180.61	12,780.44	-9,827.17	20.63	9,827.19	2.48	1.08	2.24	
22,645.00	90.64	179.85	12,779.13	-9,918.16	20.26	9,918.18	0.93	-0.41	-0.84	
22,738.00	90.45	179.52	12,778.24	-10,011.15	20.78	10,011.17	0.41	-0.20	-0.35	
22,828.00	90.79	180.11	12,777.27	-10,101.14	21.07	10,101.17	0.76	0.38	0.66	
22,872.00	89.55	179.16	12,777.14	-10,145.14	21.35	10,145.16	3.55	-2.82	-2.16	
Final Gordon MWD Survey										
22,931.00	89.55	179.16	12,777.60	-10,204.13	22.21	10,204.16	0.00	0.00	0.00	
LTP: 22931' MD										
22,980.00	89.55	179.16	12,777.98	-10,253.13	22.93	10,253.15	0.00	0.00	0.00	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 704H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3444.10usft (McVay 8)
Site:	Brot Helm Federal Com	MD Reference:	RKB @ 3444.10usft (McVay 8)
Well:	704H	North Reference:	Grid
Wellbore:	OH / 65033	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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)
Projection to TD - Gordon									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
12,179.00	12,170.94	201.62	-115.71	First Gordon MWD Survey
12,451.00	12,432.37	149.28	-93.91	FTP: 12451' MD
22,872.00	12,777.14	-10,145.14	21.35	Final Gordon MWD Survey
22,931.00	12,777.60	-10,204.13	22.21	LTP: 22931' MD
22,980.00	12,777.98	-10,253.13	22.93	Projection to TD - Gordon