



PHOENIX
TECHNOLOGY SERVICES

HOBBS OCD

DEC 16 2019

RECEIVED

COG Operating LLC

Lea County, NM (NAD27 NME)
Huckleberry State Com
502H

OH / 64200

Design: Surveys (Ensign 155)

Standard Survey Report

19 March, 2019





Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	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	Huckleberry State Com				
Site Position:		Northing:	530,679.80 usft	Latitude:	32° 27' 23.5760 N
From:	Map	Easting:	739,901.70 usft	Longitude:	103° 33' 20.0715 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.42 °

Well	502H					
Well Position	+N/-S	0.00 usft	Northing:	530,679.50 usft	Latitude:	32° 27' 23.5752 N
	+E/-W	0.00 usft	Easting:	739,871.70 usft	Longitude:	103° 33' 20.4216 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,764.80 usft

Wellbore	OH / 64200				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	3/17/2019	6.67	60.27	48,123.11606237

Design	Surveys (Ensign 155)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	357.94	

Survey Program	Date 3/19/2019				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	10,290.00	Scientific Gyro Surveys (OH / 64200)	NS-GYRO-MS	North sensing gyrocompassing m/s	
10,332.00	21,385.00	Phoenix MWD Surveys (OH / 64200)	MWD+HDGM	OWSG Rev.2 MWD + HDGM	

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	0.33	195.45	100.00	-0.28	-0.08	-0.27	0.33	0.33	0.00	
125.00	0.14	201.47	125.00	-0.38	-0.11	-0.37	0.77	-0.76	24.08	
150.00	0.31	200.22	150.00	-0.47	-0.14	-0.46	0.68	0.68	-5.00	
175.00	0.38	196.33	175.00	-0.61	-0.19	-0.60	0.30	0.28	-15.56	
200.00	0.34	189.57	200.00	-0.76	-0.22	-0.75	0.23	-0.16	-27.04	
225.00	0.37	191.48	225.00	-0.92	-0.25	-0.91	0.13	0.12	7.64	
250.00	0.35	190.08	250.00	-1.07	-0.28	-1.06	0.09	-0.08	-5.60	
275.00	0.43	193.47	275.00	-1.24	-0.32	-1.22	0.33	0.32	13.56	
300.00	0.42	186.39	300.00	-1.42	-0.35	-1.40	0.21	-0.04	-28.32	



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Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
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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)
325.00	0.45	197.24	325.00	-1.60	-0.39	-1.59	0.35	0.12	43.40
350.00	0.41	188.38	349.99	-1.79	-0.43	-1.77	0.31	-0.16	-35.44
375.00	0.46	194.79	374.99	-1.97	-0.47	-1.95	0.28	0.20	25.64
400.00	0.43	187.64	399.99	-2.16	-0.51	-2.14	0.25	-0.12	-28.60
425.00	0.42	191.06	424.99	-2.34	-0.54	-2.32	0.11	-0.04	13.68
450.00	0.45	187.35	449.99	-2.53	-0.57	-2.51	0.16	0.12	-14.84
475.00	0.43	185.42	474.99	-2.72	-0.59	-2.70	0.10	-0.08	-7.72
500.00	0.44	189.75	499.99	-2.91	-0.61	-2.89	0.14	0.04	17.32
525.00	0.47	188.22	524.99	-3.11	-0.64	-3.08	0.13	0.12	-6.12
550.00	0.47	193.54	549.99	-3.31	-0.68	-3.28	0.17	0.00	21.28
575.00	0.49	189.77	574.99	-3.51	-0.73	-3.48	0.15	0.08	-15.08
600.00	0.43	180.33	599.99	-3.71	-0.74	-3.68	0.39	-0.24	-37.76
625.00	0.47	185.36	624.99	-3.91	-0.75	-3.88	0.22	0.16	20.12
650.00	0.43	192.83	649.99	-4.10	-0.78	-4.07	0.28	-0.16	29.88
675.00	0.38	194.36	674.98	-4.27	-0.83	-4.24	0.20	-0.20	6.12
700.00	0.41	187.84	699.98	-4.44	-0.86	-4.41	0.22	0.12	-26.08
725.00	0.46	190.26	724.98	-4.63	-0.89	-4.59	0.21	0.20	9.68
750.00	0.46	193.89	749.98	-4.82	-0.93	-4.79	0.12	0.00	14.52
775.00	0.46	190.32	774.98	-5.02	-0.97	-4.98	0.11	0.00	-14.28
800.00	0.49	193.37	799.98	-5.22	-1.02	-5.18	0.16	0.12	12.20
825.00	0.45	201.42	824.98	-5.42	-1.08	-5.38	0.31	-0.16	32.20
850.00	0.45	199.90	849.98	-5.60	-1.15	-5.56	0.05	0.00	-6.08
875.00	0.51	199.55	874.98	-5.80	-1.22	-5.75	0.24	0.24	-1.40
900.00	0.48	211.22	899.98	-5.99	-1.31	-5.94	0.42	-0.12	46.68
925.00	0.51	210.06	924.98	-6.18	-1.42	-6.13	0.13	0.12	-4.64
950.00	0.42	209.36	949.98	-6.36	-1.52	-6.30	0.36	-0.36	-2.80
975.00	0.53	200.43	974.97	-6.54	-1.60	-6.48	0.53	0.44	-35.72
1,000.00	0.63	197.52	999.97	-6.78	-1.69	-6.72	0.42	0.40	-11.64
1,025.00	0.71	193.14	1,024.97	-7.07	-1.76	-7.00	0.38	0.32	-17.52
1,050.00	0.62	195.86	1,049.97	-7.35	-1.83	-7.28	0.38	-0.36	10.88
1,075.00	0.71	196.28	1,074.97	-7.63	-1.91	-7.55	0.36	0.36	1.68
1,100.00	0.68	191.89	1,099.97	-7.92	-1.99	-7.84	0.24	-0.12	-17.56
1,125.00	0.61	191.08	1,124.97	-8.20	-2.04	-8.12	0.28	-0.28	-3.24
1,150.00	0.82	189.09	1,149.96	-8.50	-2.10	-8.42	0.85	0.84	-7.96
1,175.00	0.67	186.01	1,174.96	-8.82	-2.14	-8.74	0.62	-0.60	-12.32
1,200.00	0.70	182.17	1,199.96	-9.12	-2.16	-9.04	0.22	0.12	-15.36
1,225.00	0.72	183.16	1,224.96	-9.43	-2.18	-9.35	0.09	0.08	3.96
1,250.00	0.72	184.45	1,249.96	-9.75	-2.20	-9.66	0.06	0.00	5.16
1,275.00	0.62	182.89	1,274.95	-10.04	-2.22	-9.95	0.41	-0.40	-6.24
1,300.00	0.31	172.10	1,299.95	-10.24	-2.22	-10.15	1.28	-1.24	-43.16
1,325.00	0.03	63.24	1,324.95	-10.30	-2.20	-10.22	1.28	-1.12	-435.44
1,350.00	0.20	16.94	1,349.95	-10.26	-2.18	-10.17	0.72	0.68	-185.20
1,375.00	0.22	5.67	1,374.95	-10.17	-2.16	-10.08	0.18	0.08	-45.08



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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	0.34	16.51	1,399.95	-10.05	-2.14	-9.97	0.52	0.48	43.36
1,425.00	0.23	359.52	1,424.95	-9.93	-2.12	-9.85	0.55	-0.44	-67.96
1,450.00	0.24	359.66	1,449.95	-9.83	-2.12	-9.74	0.04	0.04	0.56
1,475.00	0.22	342.02	1,474.95	-9.73	-2.13	-9.65	0.29	-0.08	-70.56
1,500.00	0.17	324.01	1,499.95	-9.65	-2.17	-9.57	0.31	-0.20	-72.04
1,525.00	0.17	300.46	1,524.95	-9.60	-2.22	-9.52	0.28	0.00	-94.20
1,550.00	0.18	324.38	1,549.95	-9.55	-2.28	-9.47	0.29	0.04	95.68
1,575.00	0.16	297.72	1,574.95	-9.51	-2.33	-9.42	0.32	-0.08	-106.64
1,600.00	0.28	326.17	1,599.95	-9.44	-2.40	-9.35	0.64	0.48	113.80
1,625.00	0.26	313.90	1,624.95	-9.35	-2.47	-9.25	0.24	-0.08	-49.08
1,650.00	0.24	306.54	1,649.95	-9.28	-2.56	-9.18	0.15	-0.08	-29.44
1,675.00	0.22	323.99	1,674.95	-9.21	-2.63	-9.11	0.29	-0.08	69.80
1,700.00	0.12	315.08	1,699.95	-9.15	-2.67	-9.05	0.41	-0.40	-35.64
1,725.00	0.18	281.96	1,724.95	-9.12	-2.73	-9.02	0.41	0.24	-132.48
1,750.00	0.18	285.75	1,749.95	-9.10	-2.81	-9.00	0.05	0.00	15.16
1,775.00	0.22	318.88	1,774.95	-9.06	-2.87	-8.95	0.48	0.16	132.52
1,800.00	0.32	336.62	1,799.95	-8.96	-2.93	-8.85	0.52	0.40	70.96
1,825.00	0.35	322.77	1,824.95	-8.83	-3.01	-8.72	0.34	0.12	-55.40
1,850.00	0.37	343.17	1,849.95	-8.69	-3.08	-8.58	0.52	0.08	81.60
1,875.00	0.52	353.44	1,874.95	-8.50	-3.11	-8.39	0.68	0.60	41.08
1,900.00	0.58	358.78	1,899.95	-8.27	-3.13	-8.15	0.32	0.24	21.36
1,925.00	0.72	8.28	1,924.94	-7.98	-3.11	-7.87	0.70	0.56	38.00
1,950.00	0.73	15.08	1,949.94	-7.67	-3.05	-7.56	0.35	0.04	27.20
1,975.00	0.82	25.80	1,974.94	-7.36	-2.93	-7.25	0.68	0.36	42.88
2,000.00	0.94	35.53	1,999.94	-7.03	-2.73	-6.93	0.76	0.48	38.92
2,025.00	1.10	38.20	2,024.93	-6.68	-2.46	-6.58	0.67	0.64	10.68
2,050.00	1.13	35.07	2,049.93	-6.29	-2.17	-6.20	0.27	0.12	-12.52
2,075.00	1.22	36.33	2,074.92	-5.87	-1.87	-5.80	0.37	0.36	5.04
2,100.00	1.35	38.29	2,099.92	-5.42	-1.53	-5.37	0.55	0.52	7.84
2,125.00	1.56	39.89	2,124.91	-4.93	-1.13	-4.89	0.86	0.84	6.40
2,150.00	1.47	42.02	2,149.90	-4.43	-0.70	-4.40	0.42	-0.36	8.52
2,175.00	1.48	42.03	2,174.89	-3.95	-0.27	-3.94	0.04	0.04	0.04
2,200.00	1.52	41.22	2,199.88	-3.47	0.17	-3.47	0.18	0.16	-3.24
2,225.00	1.08	18.46	2,224.88	-2.99	0.46	-3.01	2.68	-1.76	-91.04
2,250.00	1.04	345.41	2,249.87	-2.55	0.48	-2.56	2.42	-0.16	-132.20
2,275.00	1.20	317.67	2,274.87	-2.14	0.24	-2.14	2.24	0.64	-110.96
2,300.00	1.34	311.72	2,299.86	-1.75	-0.15	-1.74	0.77	0.56	-23.80
2,325.00	1.48	310.42	2,324.86	-1.34	-0.61	-1.32	0.57	0.56	-5.20
2,350.00	1.72	305.88	2,349.85	-0.91	-1.16	-0.87	1.08	0.96	-18.16
2,375.00	2.00	300.95	2,374.83	-0.47	-1.84	-0.40	1.29	1.12	-19.72
2,400.00	2.08	301.55	2,399.82	-0.01	-2.60	0.08	0.33	0.32	2.40
2,425.00	2.47	299.15	2,424.80	0.49	-3.46	0.61	1.61	1.56	-9.60
2,450.00	2.50	298.56	2,449.77	1.01	-4.41	1.17	0.16	0.12	-2.36



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2,475.00	2.66	297.13	2,474.75	1.54	-5.40	1.73	0.69	0.64	-5.72
2,500.00	2.77	297.14	2,499.72	2.08	-6.46	2.31	0.44	0.44	0.04
2,525.00	2.74	293.39	2,524.69	2.59	-7.54	2.86	0.73	-0.12	-15.00
2,550.00	2.86	282.96	2,549.66	2.97	-8.70	3.28	2.09	0.48	-41.72
2,575.00	2.96	277.05	2,574.63	3.19	-9.95	3.54	1.26	0.40	-23.64
2,600.00	2.96	277.67	2,599.60	3.35	-11.23	3.75	0.13	0.00	2.48
2,625.00	3.01	273.64	2,624.56	3.48	-12.52	3.93	0.86	0.20	-16.12
2,650.00	3.15	270.61	2,649.53	3.53	-13.87	4.03	0.86	0.56	-12.12
2,675.00	3.20	269.49	2,674.49	3.53	-15.25	4.08	0.32	0.20	-4.48
2,700.00	3.27	266.19	2,699.45	3.48	-16.66	4.07	0.80	0.28	-13.20
2,725.00	3.23	261.15	2,724.41	3.32	-18.07	3.97	1.15	-0.16	-20.16
2,750.00	3.17	259.12	2,749.37	3.08	-19.44	3.78	0.51	-0.24	-8.12
2,775.00	3.10	252.03	2,774.33	2.74	-20.76	3.49	1.57	-0.28	-28.36
2,800.00	2.67	235.64	2,799.30	2.21	-21.89	2.99	3.70	-1.72	-65.56
2,825.00	2.59	223.20	2,824.27	1.47	-22.75	2.28	2.30	-0.32	-49.76
2,850.00	2.37	216.16	2,849.25	0.64	-23.45	1.48	1.50	-0.88	-28.16
2,875.00	1.97	208.15	2,874.23	-0.16	-23.95	0.70	2.00	-1.60	-32.04
2,900.00	1.43	179.44	2,899.22	-0.85	-24.15	0.02	3.97	-2.16	-114.84
2,925.00	1.40	170.46	2,924.21	-1.46	-24.10	-0.60	0.89	-0.12	-35.92
2,950.00	1.44	157.93	2,949.21	-2.05	-23.93	-1.19	1.25	0.16	-50.12
2,975.00	1.59	139.76	2,974.20	-2.61	-23.59	-1.76	2.00	0.60	-72.68
3,000.00	1.83	128.00	2,999.19	-3.12	-23.05	-2.29	1.70	0.96	-47.04
3,025.00	1.89	127.31	3,024.17	-3.62	-22.41	-2.81	0.26	0.24	-2.76
3,050.00	2.11	130.03	3,049.16	-4.16	-21.73	-3.38	0.96	0.88	10.88
3,075.00	2.43	131.90	3,074.14	-4.81	-20.98	-4.06	1.31	1.28	7.48
3,100.00	2.97	137.61	3,099.11	-5.65	-20.15	-4.92	2.41	2.16	22.84
3,125.00	2.97	138.77	3,124.08	-6.61	-19.29	-5.91	0.24	0.00	4.64
3,150.00	2.92	138.30	3,149.04	-7.57	-18.44	-6.91	0.22	-0.20	-1.88
3,175.00	2.74	141.64	3,174.01	-8.52	-17.64	-7.88	0.98	-0.72	13.36
3,200.00	2.61	145.60	3,198.99	-9.46	-16.95	-8.84	0.90	-0.52	15.84
3,225.00	2.47	155.55	3,223.96	-10.42	-16.40	-9.82	1.85	-0.56	39.80
3,250.00	2.24	165.35	3,248.94	-11.38	-16.06	-10.79	1.85	-0.92	39.20
3,275.00	2.10	176.02	3,273.92	-12.31	-15.90	-11.73	1.71	-0.56	42.68
3,300.00	2.15	195.09	3,298.91	-13.22	-15.99	-12.63	2.82	0.20	76.28
3,325.00	2.23	211.28	3,323.89	-14.09	-16.37	-13.49	2.49	0.32	64.76
3,350.00	2.28	215.50	3,348.87	-14.91	-16.91	-14.29	0.69	0.20	16.88
3,375.00	2.35	219.10	3,373.85	-15.71	-17.52	-15.07	0.65	0.28	14.40
3,400.00	2.52	223.13	3,398.83	-16.51	-18.22	-15.84	0.96	0.68	16.12
3,425.00	2.64	225.21	3,423.80	-17.31	-19.00	-16.62	0.61	0.48	8.32
3,450.00	2.72	226.73	3,448.77	-18.13	-19.84	-17.40	0.43	0.32	6.08
3,475.00	2.78	229.97	3,473.74	-18.92	-20.74	-18.17	0.67	0.24	12.96
3,500.00	2.76	232.80	3,498.72	-19.68	-21.68	-18.89	0.55	-0.08	11.32
3,525.00	2.67	234.80	3,523.69	-20.38	-22.64	-19.55	0.52	-0.36	8.00
3,550.00	2.49	239.42	3,548.66	-20.99	-23.58	-20.13	1.10	-0.72	18.48



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	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	2.19	245.69	3,573.64	-21.46	-24.49	-20.57	1.58	-1.20	25.08
3,600.00	1.74	251.07	3,598.63	-21.78	-25.28	-20.86	1.94	-1.80	21.52
3,625.00	1.55	256.28	3,623.62	-21.99	-25.97	-21.04	0.97	-0.76	20.84
3,650.00	1.33	266.09	3,648.61	-22.09	-26.59	-21.12	1.32	-0.88	39.24
3,675.00	1.23	276.65	3,673.60	-22.07	-27.14	-21.08	1.02	-0.40	42.24
3,700.00	1.19	285.72	3,698.60	-21.97	-27.66	-20.96	0.78	-0.16	36.28
3,725.00	1.26	283.00	3,723.59	-21.84	-28.18	-20.81	0.36	0.28	-10.88
3,750.00	1.22	278.88	3,748.58	-21.74	-28.71	-20.69	0.39	-0.16	-16.48
3,775.00	1.24	285.89	3,773.58	-21.62	-29.23	-20.56	0.61	0.08	28.04
3,800.00	1.25	286.25	3,798.57	-21.47	-29.75	-20.39	0.05	0.04	1.44
3,825.00	1.25	283.45	3,823.57	-21.33	-30.28	-20.23	0.24	0.00	-11.20
3,850.00	1.26	284.14	3,848.56	-21.20	-30.81	-20.08	0.07	0.04	2.76
3,875.00	1.27	287.50	3,873.56	-21.05	-31.34	-19.91	0.30	0.04	13.44
3,900.00	1.23	284.33	3,898.55	-20.90	-31.87	-19.74	0.32	-0.16	-12.68
3,925.00	1.22	282.71	3,923.54	-20.78	-32.39	-19.60	0.14	-0.04	-6.48
3,950.00	1.22	281.20	3,948.54	-20.67	-32.91	-19.47	0.13	0.00	-6.04
3,975.00	1.23	282.41	3,973.53	-20.56	-33.43	-19.34	0.11	0.04	4.84
4,000.00	1.24	284.04	3,998.53	-20.43	-33.95	-19.20	0.15	0.04	6.52
4,025.00	1.30	285.31	4,023.52	-20.29	-34.49	-19.04	0.27	0.24	5.08
4,050.00	1.28	288.46	4,048.51	-20.13	-35.03	-18.86	0.29	-0.08	12.60
4,075.00	1.20	283.70	4,073.51	-19.98	-35.55	-18.69	0.52	-0.32	-19.04
4,100.00	1.25	285.62	4,098.50	-19.84	-36.06	-18.54	0.26	0.20	7.68
4,125.00	1.24	289.67	4,123.50	-19.68	-36.58	-18.35	0.35	-0.04	16.20
4,150.00	1.20	287.40	4,148.49	-19.51	-37.09	-18.17	0.25	-0.16	-9.08
4,175.00	1.24	287.97	4,173.49	-19.35	-37.59	-17.99	0.17	0.16	2.28
4,200.00	1.21	289.50	4,198.48	-19.18	-38.10	-17.80	0.18	-0.12	6.12
4,225.00	1.10	287.74	4,223.47	-19.02	-38.58	-17.62	0.46	-0.44	-7.04
4,250.00	0.73	277.63	4,248.47	-18.92	-38.96	-17.51	1.61	-1.48	-40.44
4,275.00	0.56	268.93	4,273.47	-18.90	-39.24	-17.48	0.78	-0.68	-34.80
4,300.00	0.46	279.11	4,298.47	-18.89	-39.46	-17.46	0.54	-0.40	40.72
4,325.00	0.48	284.53	4,323.47	-18.85	-39.66	-17.41	0.19	0.08	21.68
4,350.00	0.44	275.32	4,348.47	-18.81	-39.86	-17.37	0.34	-0.16	-36.84
4,375.00	0.46	272.74	4,373.47	-18.80	-40.06	-17.35	0.11	0.08	-10.32
4,400.00	0.67	277.69	4,398.46	-18.77	-40.30	-17.31	0.86	0.84	19.80
4,425.00	1.04	262.68	4,423.46	-18.78	-40.67	-17.31	1.72	1.48	-60.04
4,450.00	0.97	273.26	4,448.46	-18.80	-41.11	-17.31	0.79	-0.28	42.32
4,475.00	1.16	263.94	4,473.45	-18.81	-41.57	-17.31	1.03	0.76	-37.28
4,500.00	1.42	257.37	4,498.45	-18.91	-42.13	-17.38	1.19	1.04	-26.28
4,525.00	1.67	251.18	4,523.44	-19.09	-42.77	-17.55	1.20	1.00	-24.76
4,550.00	1.44	261.47	4,548.43	-19.26	-43.43	-17.69	1.44	-0.92	41.16
4,575.00	1.61	255.54	4,573.42	-19.39	-44.08	-17.80	0.93	0.68	-23.72
4,600.00	1.65	250.74	4,598.41	-19.60	-44.76	-17.98	0.57	0.16	-19.20
4,625.00	1.70	234.51	4,623.40	-19.93	-45.40	-18.29	1.90	0.20	-64.92



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	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	2.33	230.86	4,648.38	-20.47	-46.10	-18.80	2.57	2.52	-14.60
4,675.00	2.66	227.91	4,673.36	-21.18	-46.92	-19.48	1.42	1.32	-11.80
4,700.00	2.90	228.27	4,698.33	-21.99	-47.82	-20.26	0.96	0.96	1.44
4,725.00	3.11	225.13	4,723.30	-22.89	-48.78	-21.12	1.07	0.84	-12.56
4,750.00	3.43	225.80	4,748.26	-23.89	-49.79	-22.08	1.29	1.28	2.68
4,775.00	3.50	226.56	4,773.21	-24.93	-50.88	-23.09	0.33	0.28	3.04
4,800.00	3.83	226.01	4,798.16	-26.04	-52.04	-24.15	1.33	1.32	-2.20
4,825.00	3.92	226.68	4,823.10	-27.20	-53.26	-25.27	0.40	0.36	2.68
4,850.00	3.93	226.64	4,848.04	-28.38	-54.50	-26.40	0.04	0.04	-0.16
4,875.00	4.06	224.89	4,872.98	-29.59	-55.75	-27.57	0.71	0.52	-7.00
4,900.00	4.28	224.18	4,897.92	-30.89	-57.03	-28.82	0.90	0.88	-2.84
4,925.00	4.51	223.45	4,922.84	-32.27	-58.35	-30.16	0.95	0.92	-2.92
4,950.00	4.80	222.95	4,947.76	-33.75	-59.74	-31.58	1.17	1.16	-2.00
4,975.00	5.03	222.18	4,972.67	-35.33	-61.19	-33.11	0.96	0.92	-3.08
5,000.00	5.12	221.43	4,997.57	-36.98	-62.66	-34.70	0.45	0.36	-3.00
5,025.00	5.15	221.77	5,022.47	-38.65	-64.15	-36.32	0.17	0.12	1.36
5,050.00	5.20	220.56	5,047.37	-40.35	-65.63	-37.97	0.48	0.20	-4.84
5,075.00	5.52	220.34	5,072.26	-42.13	-67.15	-39.69	1.28	1.28	-0.88
5,100.00	5.64	219.24	5,097.14	-43.99	-68.70	-41.50	0.64	0.48	-4.40
5,125.00	5.77	217.28	5,122.02	-45.95	-70.24	-43.39	0.94	0.52	-7.84
5,150.00	5.88	217.90	5,146.89	-47.96	-71.79	-45.35	0.51	0.44	2.48
5,175.00	6.06	216.30	5,171.75	-50.03	-73.36	-47.36	0.98	0.72	-6.40
5,200.00	6.28	216.36	5,196.61	-52.19	-74.95	-49.47	0.88	0.88	0.24
5,225.00	6.40	215.40	5,221.45	-54.43	-76.57	-51.65	0.64	0.48	-3.84
5,250.00	6.54	215.18	5,246.29	-56.73	-78.20	-53.89	0.57	0.56	-0.88
5,275.00	6.65	213.55	5,271.13	-59.10	-79.82	-56.20	0.87	0.44	-6.52
5,300.00	6.93	213.86	5,295.95	-61.56	-81.46	-58.59	1.13	1.12	1.24
5,325.00	7.27	213.94	5,320.76	-64.12	-83.18	-61.10	1.36	1.36	0.32
5,350.00	7.32	212.31	5,345.56	-66.78	-84.91	-63.69	0.85	0.20	-6.52
5,375.00	7.50	212.07	5,370.35	-69.51	-86.63	-66.36	0.73	0.72	-0.96
5,400.00	7.44	211.62	5,395.14	-72.27	-88.35	-69.05	0.34	-0.24	-1.80
5,425.00	7.37	212.30	5,419.93	-75.01	-90.05	-71.72	0.45	-0.28	2.72
5,450.00	7.16	212.30	5,444.73	-77.68	-91.74	-74.33	0.84	-0.84	0.00
5,475.00	7.09	211.57	5,469.54	-80.31	-93.38	-76.90	0.46	-0.28	-2.92
5,500.00	7.12	212.32	5,494.34	-82.93	-95.02	-79.47	0.39	0.12	3.00
5,525.00	6.59	213.70	5,519.17	-85.44	-96.64	-81.91	2.22	-2.12	5.52
5,550.00	5.13	223.32	5,544.04	-87.44	-98.21	-83.86	7.02	-5.84	38.48
5,575.00	4.33	232.95	5,568.95	-88.83	-99.73	-85.19	4.50	-3.20	38.52
5,600.00	3.99	237.69	5,593.88	-89.86	-101.21	-86.17	1.93	-1.36	18.96
5,625.00	4.06	246.37	5,618.82	-90.68	-102.76	-86.93	2.45	0.28	34.72
5,650.00	4.61	265.46	5,643.75	-91.11	-104.57	-87.30	6.14	2.20	76.36
5,675.00	4.70	269.77	5,668.67	-91.20	-106.60	-87.31	1.44	0.36	17.24
5,700.00	4.68	272.18	5,693.59	-91.16	-108.64	-87.20	0.79	-0.08	9.64



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	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	4.67	273.58	5,718.50	-91.06	-110.68	-87.03	0.46	-0.04	5.60
5,750.00	4.71	272.88	5,743.42	-90.94	-112.72	-86.84	0.28	0.16	-2.80
5,775.00	4.71	272.88	5,768.34	-90.84	-114.77	-86.66	0.00	0.00	0.00
5,800.00	4.58	273.28	5,793.25	-90.73	-116.79	-86.48	0.54	-0.52	1.60
5,825.00	3.82	267.27	5,818.19	-90.71	-118.62	-86.40	3.51	-3.04	-24.04
5,850.00	3.39	259.80	5,843.14	-90.89	-120.18	-86.51	2.54	-1.72	-29.88
5,875.00	3.07	257.90	5,868.10	-91.16	-121.56	-86.73	1.35	-1.28	-7.60
5,900.00	3.03	256.59	5,893.06	-91.45	-122.86	-86.98	0.32	-0.16	-5.24
5,925.00	3.03	256.68	5,918.03	-91.76	-124.14	-87.24	0.02	0.00	0.36
5,950.00	2.98	256.21	5,942.99	-92.06	-125.42	-87.50	0.22	-0.20	-1.88
5,975.00	2.94	257.73	5,967.96	-92.35	-126.67	-87.74	0.35	-0.16	6.08
6,000.00	2.52	259.76	5,992.93	-92.59	-127.84	-87.94	1.72	-1.68	8.12
6,025.00	2.17	261.42	6,017.91	-92.76	-128.85	-88.07	1.43	-1.40	6.64
6,050.00	1.67	267.63	6,042.90	-92.84	-129.68	-88.12	2.16	-2.00	24.84
6,075.00	1.64	271.86	6,067.89	-92.85	-130.40	-88.10	0.50	-0.12	16.92
6,100.00	1.56	274.21	6,092.88	-92.81	-131.10	-88.04	0.41	-0.32	9.40
6,125.00	1.52	271.88	6,117.87	-92.77	-131.77	-87.98	0.30	-0.16	-9.32
6,150.00	1.61	269.79	6,142.86	-92.76	-132.45	-87.95	0.43	0.36	-8.36
6,175.00	1.73	273.28	6,167.85	-92.74	-133.18	-87.90	0.63	0.48	13.96
6,200.00	1.56	273.30	6,192.84	-92.70	-133.90	-87.83	0.68	-0.68	0.08
6,225.00	1.68	271.85	6,217.83	-92.67	-134.60	-87.78	0.51	0.48	-5.80
6,250.00	1.75	273.50	6,242.81	-92.64	-135.35	-87.71	0.34	0.28	6.60
6,275.00	1.88	273.05	6,267.80	-92.59	-136.14	-87.64	0.52	0.52	-1.80
6,300.00	2.60	273.00	6,292.78	-92.54	-137.12	-87.55	2.88	2.88	-0.20
6,325.00	3.32	271.75	6,317.75	-92.49	-138.41	-87.46	2.89	2.88	-5.00
6,350.00	3.87	273.32	6,342.70	-92.42	-139.97	-87.33	2.23	2.20	6.28
6,375.00	3.72	272.67	6,367.65	-92.33	-141.63	-87.18	0.62	-0.60	-2.60
6,400.00	3.89	271.78	6,392.59	-92.26	-143.28	-87.06	0.72	0.68	-3.56
6,425.00	3.94	272.72	6,417.53	-92.20	-144.99	-86.93	0.33	0.20	3.76
6,450.00	4.04	272.79	6,442.47	-92.11	-146.73	-86.78	0.40	0.40	0.28
6,475.00	4.01	271.77	6,467.41	-92.04	-148.48	-86.65	0.31	-0.12	-4.08
6,500.00	3.98	271.76	6,492.35	-91.99	-150.22	-86.54	0.12	-0.12	-0.04
6,525.00	4.00	272.75	6,517.29	-91.92	-151.96	-86.41	0.29	0.08	3.96
6,550.00	4.00	272.86	6,542.23	-91.84	-153.70	-86.26	0.03	0.00	0.44
6,575.00	4.02	273.20	6,567.17	-91.74	-155.45	-86.10	0.12	0.08	1.36
6,600.00	4.13	273.38	6,592.10	-91.64	-157.22	-85.94	0.44	0.44	0.72
6,625.00	3.96	275.19	6,617.04	-91.51	-158.98	-85.74	0.85	-0.68	7.24
6,650.00	4.03	273.57	6,641.98	-91.38	-160.71	-85.55	0.53	0.28	-6.48
6,675.00	3.97	273.78	6,666.92	-91.27	-162.45	-85.37	0.25	-0.24	0.84
6,700.00	4.00	273.95	6,691.86	-91.15	-164.19	-85.19	0.13	0.12	0.68
6,725.00	4.01	274.46	6,716.80	-91.02	-165.93	-85.00	0.15	0.04	2.04
6,750.00	3.93	275.06	6,741.74	-90.88	-167.65	-84.80	0.36	-0.32	2.40
6,775.00	3.88	275.82	6,766.68	-90.72	-169.35	-84.58	0.29	-0.20	3.04
6,800.00	3.98	275.57	6,791.62	-90.55	-171.05	-84.34	0.41	0.40	-1.00

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	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	3.88	275.22	6,816.56	-90.39	-172.76	-84.12	0.41	-0.40	-1.40
6,850.00	3.91	276.45	6,841.50	-90.21	-174.45	-83.89	0.36	0.12	4.92
6,875.00	3.80	276.73	6,866.45	-90.02	-176.12	-83.64	0.45	-0.44	1.12
6,900.00	3.89	277.62	6,891.39	-89.81	-177.78	-83.37	0.43	0.36	3.56
6,925.00	3.73	277.45	6,916.34	-89.59	-179.43	-83.09	0.64	-0.64	-0.68
6,950.00	3.60	278.28	6,941.29	-89.37	-181.01	-82.82	0.56	-0.52	3.32
6,975.00	3.61	277.51	6,966.24	-89.16	-182.57	-82.54	0.20	0.04	-3.08
7,000.00	3.64	276.82	6,991.19	-88.96	-184.14	-82.29	0.21	0.12	-2.76
7,025.00	3.69	277.80	7,016.13	-88.76	-185.72	-82.03	0.32	0.20	3.92
7,050.00	3.96	274.02	7,041.08	-88.59	-187.38	-81.80	1.48	1.08	-15.12
7,075.00	4.36	269.35	7,066.01	-88.54	-189.19	-81.69	2.10	1.60	-18.68
7,100.00	4.70	267.53	7,090.93	-88.59	-191.17	-81.67	1.48	1.36	-7.28
7,125.00	4.78	267.68	7,115.85	-88.68	-193.23	-81.68	0.32	0.32	0.60
7,150.00	4.80	267.13	7,140.76	-88.77	-195.31	-81.70	0.20	0.08	-2.20
7,175.00	4.63	266.84	7,165.68	-88.88	-197.37	-81.74	0.69	-0.68	-1.16
7,200.00	4.73	267.91	7,190.59	-88.98	-199.40	-81.76	0.53	0.40	4.28
7,225.00	4.52	267.69	7,215.51	-89.05	-201.42	-81.76	0.84	-0.84	-0.88
7,250.00	4.31	267.78	7,240.44	-89.13	-203.34	-81.77	0.84	-0.84	0.36
7,275.00	4.22	268.46	7,265.37	-89.19	-205.20	-81.76	0.41	-0.36	2.72
7,300.00	4.20	269.43	7,290.30	-89.22	-207.04	-81.73	0.30	-0.08	3.88
7,325.00	3.92	268.10	7,315.24	-89.26	-208.80	-81.70	1.18	-1.12	-5.32
7,350.00	3.97	268.92	7,340.18	-89.31	-210.52	-81.69	0.30	0.20	3.28
7,375.00	3.83	269.57	7,365.12	-89.33	-212.22	-81.65	0.59	-0.56	2.60
7,400.00	3.74	268.22	7,390.07	-89.36	-213.87	-81.62	0.51	-0.36	-5.40
7,425.00	3.69	263.87	7,415.01	-89.47	-215.49	-81.67	1.14	-0.20	-17.40
7,450.00	3.60	257.54	7,439.96	-89.73	-217.06	-81.87	1.65	-0.36	-25.32
7,475.00	3.43	246.25	7,464.92	-90.20	-218.51	-82.29	2.85	-0.68	-45.16
7,500.00	3.40	243.07	7,489.87	-90.83	-219.85	-82.88	0.77	-0.12	-12.72
7,525.00	3.45	244.74	7,514.83	-91.49	-221.19	-83.49	0.45	0.20	6.68
7,550.00	3.47	242.44	7,539.78	-92.16	-222.54	-84.11	0.56	0.08	-9.20
7,575.00	3.49	243.89	7,564.74	-92.85	-223.90	-84.75	0.36	0.08	5.80
7,600.00	3.53	244.80	7,589.69	-93.51	-225.28	-85.36	0.27	0.16	3.64
7,625.00	3.51	244.29	7,614.64	-94.17	-226.66	-85.97	0.15	-0.08	-2.04
7,650.00	3.56	243.41	7,639.60	-94.85	-228.05	-86.60	0.30	0.20	-3.52
7,675.00	3.59	243.75	7,664.55	-95.54	-229.44	-87.24	0.15	0.12	1.36
7,700.00	3.48	245.98	7,689.50	-96.20	-230.84	-87.84	0.70	-0.44	8.92
7,725.00	3.12	250.80	7,714.46	-96.73	-232.17	-88.33	1.82	-1.44	19.28
7,750.00	2.77	259.67	7,739.42	-97.06	-233.41	-88.62	2.29	-1.40	35.48
7,775.00	2.57	264.72	7,764.40	-97.22	-234.56	-88.73	1.23	-0.80	20.20
7,800.00	2.50	265.37	7,789.37	-97.32	-235.66	-88.79	0.30	-0.28	2.60
7,825.00	2.48	265.65	7,814.35	-97.40	-236.75	-88.84	0.09	-0.08	1.12
7,850.00	2.54	264.51	7,839.33	-97.50	-237.84	-88.89	0.31	0.24	-4.56
7,875.00	2.43	265.86	7,864.30	-97.59	-238.92	-88.94	0.50	-0.44	5.40



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	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	2.32	265.23	7,889.28	-97.67	-239.95	-88.99	0.45	-0.44	-2.52
7,925.00	2.41	264.75	7,914.26	-97.76	-240.98	-89.04	0.37	0.36	-1.92
7,950.00	2.44	265.23	7,939.24	-97.85	-242.03	-89.09	0.14	0.12	1.92
7,975.00	2.41	266.29	7,964.21	-97.93	-243.09	-89.13	0.22	-0.12	4.24
8,000.00	2.38	267.32	7,989.19	-97.99	-244.13	-89.16	0.21	-0.12	4.12
8,025.00	2.43	265.67	8,014.17	-98.05	-245.18	-89.18	0.34	0.20	-6.60
8,050.00	2.53	266.74	8,039.15	-98.12	-246.26	-89.21	0.44	0.40	4.28
8,075.00	2.55	266.70	8,064.12	-98.19	-247.36	-89.24	0.08	0.08	-0.16
8,100.00	2.87	261.29	8,089.09	-98.31	-248.54	-89.32	1.64	1.28	-21.64
8,125.00	3.92	259.27	8,114.05	-98.57	-249.99	-89.52	4.23	4.20	-8.08
8,150.00	4.22	259.73	8,138.99	-98.89	-251.74	-89.78	1.21	1.20	1.84
8,175.00	4.42	258.23	8,163.92	-99.25	-253.59	-90.08	0.92	0.80	-6.00
8,200.00	4.43	258.22	8,188.84	-99.64	-255.48	-90.40	0.04	0.04	-0.04
8,225.00	4.40	258.59	8,213.77	-100.03	-257.36	-90.72	0.17	-0.12	1.48
8,250.00	4.47	258.55	8,238.69	-100.41	-259.26	-91.04	0.28	0.28	-0.16
8,275.00	4.46	258.26	8,263.62	-100.80	-261.16	-91.36	0.10	-0.04	-1.16
8,300.00	4.54	258.28	8,288.54	-101.20	-263.08	-91.69	0.32	0.32	0.08
8,325.00	4.58	257.69	8,313.46	-101.62	-265.03	-92.03	0.25	0.16	-2.36
8,350.00	4.58	259.21	8,338.38	-102.02	-266.98	-92.36	0.49	0.00	6.08
8,375.00	4.56	259.30	8,363.30	-102.39	-268.94	-92.66	0.08	-0.08	0.36
8,400.00	4.44	259.06	8,388.22	-102.76	-270.87	-92.96	0.49	-0.48	-0.96
8,425.00	4.34	259.37	8,413.15	-103.11	-272.75	-93.25	0.41	-0.40	1.24
8,450.00	4.32	258.89	8,438.08	-103.47	-274.60	-93.54	0.17	-0.08	-1.92
8,475.00	3.95	256.20	8,463.01	-103.86	-276.36	-93.86	1.67	-1.48	-10.76
8,500.00	3.23	246.38	8,487.97	-104.35	-277.84	-94.30	3.78	-2.88	-39.28
8,525.00	2.84	234.83	8,512.93	-104.98	-278.99	-94.90	2.89	-1.56	-46.20
8,550.00	2.65	229.08	8,537.90	-105.72	-279.94	-95.60	1.34	-0.76	-23.00
8,575.00	2.69	227.76	8,562.87	-106.49	-280.81	-96.34	0.29	0.16	-5.28
8,600.00	2.76	229.34	8,587.85	-107.28	-281.70	-97.09	0.41	0.28	6.32
8,625.00	2.81	230.61	8,612.82	-108.06	-282.63	-97.84	0.32	0.20	5.08
8,650.00	2.54	228.50	8,637.79	-108.82	-283.52	-98.56	1.15	-1.08	-8.44
8,675.00	2.18	212.79	8,662.77	-109.58	-284.19	-99.30	2.95	-1.44	-62.84
8,700.00	1.99	200.49	8,687.75	-110.39	-284.60	-100.10	1.94	-0.76	-49.20
8,725.00	1.93	196.23	8,712.74	-111.20	-284.87	-100.90	0.63	-0.24	-17.04
8,750.00	1.64	198.53	8,737.73	-111.94	-285.10	-101.63	1.19	-1.16	9.20
8,775.00	1.07	208.50	8,762.72	-112.49	-285.32	-102.17	2.46	-2.28	39.88
8,800.00	0.68	239.64	8,787.72	-112.77	-285.56	-102.44	2.41	-1.56	124.56
8,825.00	0.74	265.21	8,812.71	-112.86	-285.85	-102.52	1.28	0.24	102.28
8,850.00	0.69	264.78	8,837.71	-112.88	-286.16	-102.53	0.20	-0.20	-1.72
8,875.00	0.65	261.01	8,862.71	-112.92	-286.45	-102.56	0.24	-0.16	-15.08
8,900.00	0.65	258.48	8,887.71	-112.97	-286.73	-102.60	0.11	0.00	-10.12
8,925.00	0.61	260.22	8,912.71	-113.02	-287.00	-102.64	0.18	-0.16	6.96
8,950.00	0.71	262.46	8,937.71	-113.06	-287.29	-102.67	0.41	0.40	8.96



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
8,975.00	0.74	262.27	8,962.70	-113.11	-287.60	-102.70	0.12	0.12	-0.76
9,000.00	0.68	261.02	8,987.70	-113.15	-287.91	-102.74	0.25	-0.24	-5.00
9,025.00	0.68	263.68	9,012.70	-113.19	-288.20	-102.77	0.13	0.00	10.64
9,050.00	0.70	263.12	9,037.70	-113.22	-288.50	-102.79	0.08	0.08	-2.24
9,075.00	0.60	258.43	9,062.70	-113.27	-288.78	-102.82	0.45	-0.40	-18.76
9,100.00	0.55	272.59	9,087.70	-113.29	-289.03	-102.84	0.60	-0.20	56.64
9,125.00	0.37	270.51	9,112.69	-113.28	-289.23	-102.82	0.72	-0.72	-8.32
9,150.00	0.37	282.04	9,137.69	-113.27	-289.39	-102.80	0.30	0.00	46.12
9,175.00	0.45	280.19	9,162.69	-113.23	-289.56	-102.76	0.32	0.32	-7.40
9,200.00	0.41	273.89	9,187.69	-113.21	-289.75	-102.73	0.25	-0.16	-25.20
9,225.00	0.35	275.78	9,212.69	-113.19	-289.92	-102.71	0.25	-0.24	7.56
9,250.00	0.36	274.02	9,237.69	-113.18	-290.07	-102.69	0.06	0.04	-7.04
9,275.00	0.34	285.32	9,262.69	-113.16	-290.22	-102.66	0.29	-0.08	45.20
9,300.00	0.40	282.34	9,287.69	-113.12	-290.38	-102.62	0.25	0.24	-11.92
9,325.00	0.34	272.13	9,312.69	-113.10	-290.54	-102.59	0.36	-0.24	-40.84
9,350.00	0.23	282.96	9,337.69	-113.08	-290.66	-102.57	0.49	-0.44	43.32
9,375.00	0.20	255.64	9,362.69	-113.08	-290.75	-102.57	0.42	-0.12	-109.28
9,400.00	0.21	216.86	9,387.69	-113.13	-290.82	-102.61	0.55	0.04	-155.12
9,425.00	0.13	195.18	9,412.69	-113.19	-290.85	-102.67	0.41	-0.32	-86.72
9,450.00	0.10	194.66	9,437.69	-113.24	-290.87	-102.72	0.12	-0.12	-2.08
9,475.00	0.17	155.48	9,462.69	-113.30	-290.86	-102.78	0.45	0.28	-156.72
9,500.00	0.04	183.74	9,487.69	-113.34	-290.84	-102.82	0.54	-0.52	113.04
9,525.00	0.11	160.38	9,512.69	-113.37	-290.84	-102.85	0.30	0.28	-93.44
9,550.00	0.13	94.45	9,537.69	-113.40	-290.80	-102.88	0.53	0.08	-263.72
9,575.00	0.15	109.56	9,562.69	-113.41	-290.74	-102.89	0.17	0.08	60.44
9,600.00	0.23	96.07	9,587.69	-113.43	-290.66	-102.91	0.36	0.32	-53.96
9,625.00	0.18	139.73	9,612.69	-113.46	-290.58	-102.95	0.64	-0.20	174.64
9,650.00	0.23	144.58	9,637.69	-113.53	-290.53	-103.02	0.21	0.20	19.40
9,675.00	0.46	168.45	9,662.69	-113.67	-290.48	-103.16	1.07	0.92	95.48
9,700.00	0.69	168.93	9,687.69	-113.92	-290.43	-103.41	0.92	0.92	1.92
9,725.00	0.75	184.05	9,712.68	-114.23	-290.41	-103.72	0.79	0.24	60.48
9,750.00	0.87	172.03	9,737.68	-114.58	-290.40	-104.07	0.83	0.48	-48.08
9,775.00	1.04	170.81	9,762.68	-114.99	-290.34	-104.49	0.68	0.68	-4.88
9,800.00	1.12	164.70	9,787.67	-115.45	-290.24	-104.95	0.56	0.32	-24.44
9,825.00	1.30	161.69	9,812.67	-115.96	-290.08	-105.46	0.76	0.72	-12.04
9,850.00	1.45	156.07	9,837.66	-116.51	-289.86	-106.03	0.81	0.60	-22.48
9,875.00	1.44	156.71	9,862.65	-117.09	-289.61	-106.61	0.08	-0.04	2.56
9,900.00	1.53	153.30	9,887.65	-117.68	-289.34	-107.21	0.50	0.36	-13.64
9,925.00	1.59	151.27	9,912.64	-118.28	-289.02	-107.82	0.33	0.24	-8.12
9,950.00	1.35	155.07	9,937.63	-118.85	-288.73	-108.40	1.04	-0.96	15.20
9,975.00	1.08	157.52	9,962.62	-119.34	-288.52	-108.90	1.10	-1.08	9.80
10,000.00	0.62	157.64	9,987.62	-119.68	-288.38	-109.24	1.84	-1.84	0.48
10,025.00	0.25	248.39	10,012.62	-119.82	-288.37	-109.39	2.69	-1.48	363.00
10,050.00	0.27	285.61	10,037.62	-119.83	-288.48	-109.39	0.67	0.08	148.88



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
10,075.00	0.40	283.66	10,062.62	-119.79	-288.62	-109.35	0.52	0.52	-7.80
10,100.00	0.43	290.42	10,087.62	-119.74	-288.80	-109.29	0.23	0.12	27.04
10,125.00	0.44	292.18	10,112.62	-119.67	-288.97	-109.21	0.07	0.04	7.04
10,150.00	0.51	297.40	10,137.62	-119.58	-289.16	-109.12	0.33	0.28	20.88
10,175.00	0.61	302.13	10,162.61	-119.46	-289.37	-108.99	0.44	0.40	18.92
10,200.00	0.43	292.66	10,187.61	-119.35	-289.57	-108.88	0.80	-0.72	-37.88
10,225.00	0.46	297.84	10,212.61	-119.27	-289.75	-108.79	0.20	0.12	20.72
10,250.00	0.50	303.50	10,237.61	-119.16	-289.93	-108.67	0.25	0.16	22.64
10,275.00	0.73	294.10	10,262.61	-119.04	-290.16	-108.54	1.00	0.92	-37.60
10,290.00	0.49	307.28	10,277.61	-118.96	-290.30	-108.46	1.84	-1.60	87.87
Tie In - Tie In									
10,332.00	0.48	285.41	10,319.61	-118.80	-290.61	-108.29	0.44	-0.02	-52.07
First Phoenix MWD Survey									
10,390.00	0.54	293.91	10,377.61	-118.63	-291.10	-108.10	0.17	0.10	14.66
10,421.00	1.04	343.25	10,408.60	-118.30	-291.31	-107.76	2.58	1.61	159.16
10,453.00	4.04	2.21	10,440.57	-116.90	-291.35	-106.36	9.61	9.38	59.25
10,484.00	7.74	359.97	10,471.40	-113.72	-291.31	-103.18	11.96	11.94	-7.23
10,516.00	12.26	354.67	10,502.91	-108.18	-291.63	-97.63	14.40	14.13	-16.56
10,547.00	15.54	351.46	10,532.99	-100.79	-292.55	-90.22	10.87	10.58	-10.35
10,578.00	17.82	351.06	10,562.69	-92.00	-293.90	-81.38	7.36	7.35	-1.29
10,610.00	19.66	351.65	10,592.99	-81.83	-295.45	-71.17	5.78	5.75	1.84
10,641.00	21.31	351.03	10,622.03	-71.11	-297.08	-60.39	5.37	5.32	-2.00
10,672.00	24.04	354.60	10,650.63	-59.25	-298.56	-48.49	9.86	8.81	11.52
10,704.00	27.10	356.64	10,679.49	-45.49	-299.60	-34.70	9.95	9.56	6.38
10,735.00	29.66	358.67	10,706.77	-30.77	-300.19	-19.96	8.82	8.26	6.55
10,767.00	31.20	1.05	10,734.36	-14.56	-300.22	-3.77	6.11	4.81	7.44
10,798.00	33.60	359.54	10,760.53	2.05	-300.14	12.82	8.17	7.74	-4.87
10,829.00	36.52	357.04	10,785.91	19.84	-300.69	30.63	10.50	9.42	-8.06
10,860.00	39.45	356.46	10,810.34	38.89	-301.77	49.70	9.52	9.45	-1.87
10,892.00	42.17	359.16	10,834.56	59.78	-302.56	70.61	10.13	8.50	8.44
10,923.00	44.90	358.32	10,857.03	81.12	-303.03	91.96	9.00	8.81	-2.71
10,954.00	48.58	358.87	10,878.27	103.69	-303.58	114.53	11.94	11.87	1.77
10,986.00	52.64	358.83	10,898.57	128.41	-304.08	139.25	12.69	12.69	-0.13
11,017.00	56.19	358.77	10,916.61	153.61	-304.61	164.45	11.45	11.45	-0.19
11,049.00	58.82	359.69	10,933.80	180.60	-304.97	191.43	8.57	8.22	2.88
11,080.00	62.30	359.58	10,949.03	207.59	-305.14	218.41	11.23	11.23	-0.35
11,111.00	65.60	359.97	10,962.64	235.43	-305.25	246.25	10.70	10.65	1.26
11,143.00	68.64	359.57	10,975.08	264.91	-305.37	275.71	9.57	9.50	-1.25
11,174.00	71.23	358.82	10,985.72	294.03	-305.78	304.82	8.66	8.35	-2.42
11,206.00	73.68	358.63	10,995.37	324.53	-306.46	335.32	7.68	7.66	-0.59
11,237.00	76.00	358.98	11,003.47	354.44	-307.08	365.24	7.56	7.48	1.13
11,251.00	76.98	359.75	11,006.74	368.05	-307.23	378.85	8.81	7.00	5.50
11,280.00	78.27	0.59	11,012.96	396.38	-307.14	407.15	5.27	4.45	2.90



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	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)
11,311.00	80.18	1.56	11,018.75	426.82	-306.57	437.56	6.89	6.16	3.13
11,342.00	81.48	3.06	11,023.69	457.40	-305.34	468.07	6.36	4.19	4.84
11,358.38	82.56	3.60	11,025.97	473.59	-304.40	484.22	7.35	6.60	3.27
FTP: 11358.38' MD									
11,372.00	83.46	4.04	11,027.62	487.08	-303.50	497.67	7.35	6.60	3.26
11,403.00	85.99	5.47	11,030.47	517.84	-300.94	528.32	9.36	8.16	4.61
11,433.00	87.62	5.88	11,032.15	547.65	-297.98	558.00	5.60	5.43	1.37
11,464.00	89.92	5.21	11,032.81	578.49	-294.98	588.71	7.73	7.42	-2.16
11,555.00	93.36	0.45	11,030.21	669.30	-290.49	679.31	6.45	3.78	-5.23
11,646.00	91.54	356.88	11,026.32	760.18	-292.61	770.20	4.40	-2.00	-3.92
11,737.00	92.83	355.56	11,022.85	850.91	-298.60	861.09	2.03	1.42	-1.45
11,826.00	93.25	356.21	11,018.13	939.56	-304.98	949.90	0.87	0.47	0.73
11,920.00	92.02	355.62	11,013.80	1,033.22	-311.67	1,043.74	1.45	-1.31	-0.63
12,010.00	90.22	356.06	11,012.05	1,122.96	-318.20	1,133.66	2.06	-2.00	0.49
12,104.00	89.30	357.00	11,012.44	1,216.78	-323.89	1,227.63	1.40	-0.98	1.00
12,199.00	89.41	358.54	11,013.51	1,311.70	-327.58	1,322.62	1.63	0.12	1.62
12,292.00	90.70	358.03	11,013.42	1,404.66	-330.36	1,415.62	1.49	1.39	-0.55
12,386.00	92.07	356.90	11,011.15	1,498.53	-334.52	1,509.58	1.89	1.46	-1.20
12,481.00	91.76	357.70	11,007.97	1,593.37	-338.99	1,604.52	0.90	-0.33	0.84
12,574.00	90.64	359.00	11,006.02	1,686.31	-341.67	1,697.50	1.84	-1.20	1.40
12,669.00	90.53	359.73	11,005.05	1,781.30	-342.72	1,792.46	0.78	-0.12	0.77
12,763.00	92.21	359.11	11,002.81	1,875.27	-343.67	1,886.40	1.90	1.79	-0.66
12,857.00	92.58	0.00	10,998.88	1,969.18	-344.40	1,980.28	1.02	0.39	0.95
12,951.00	88.91	0.50	10,997.66	2,063.15	-343.99	2,074.18	3.94	-3.90	0.53
13,044.00	90.36	359.90	10,998.25	2,156.15	-343.67	2,167.10	1.69	1.56	-0.65
13,138.00	89.78	0.96	10,998.13	2,250.14	-342.96	2,261.01	1.29	-0.62	1.13
13,232.00	88.94	1.19	10,999.18	2,344.12	-341.20	2,354.86	0.93	-0.89	0.24
13,326.00	89.97	359.86	11,000.08	2,438.11	-340.34	2,448.76	1.79	1.10	-1.41
13,420.00	89.27	359.26	11,000.70	2,532.10	-341.06	2,542.72	0.98	-0.74	-0.64
13,514.00	88.74	0.05	11,002.33	2,626.09	-341.63	2,636.66	1.01	-0.56	0.84
13,608.00	89.55	359.56	11,003.74	2,720.07	-341.95	2,730.60	1.01	0.86	-0.52
13,701.00	91.01	358.06	11,003.28	2,813.05	-343.88	2,823.58	2.25	1.57	-1.61
13,795.00	91.34	358.22	11,001.36	2,906.98	-346.93	2,917.56	0.39	0.35	0.17
13,889.00	91.12	359.73	10,999.34	3,000.94	-348.61	3,011.52	1.62	-0.23	1.61
13,983.00	89.64	1.10	10,998.71	3,094.93	-347.93	3,105.43	2.15	-1.57	1.46
14,077.00	90.36	0.28	10,998.71	3,188.92	-346.80	3,199.32	1.16	0.77	-0.87
14,170.00	91.62	359.53	10,997.11	3,281.90	-346.95	3,292.25	1.58	1.35	-0.81
14,264.00	91.18	359.97	10,994.81	3,375.88	-347.36	3,386.17	0.66	-0.47	0.47
14,357.00	92.19	359.98	10,992.08	3,468.83	-347.40	3,479.07	1.09	1.09	0.01
14,451.00	91.90	0.08	10,988.72	3,562.77	-347.35	3,572.95	0.33	-0.31	0.11
14,546.00	90.73	0.47	10,986.54	3,657.75	-346.90	3,667.85	1.30	-1.23	0.41
14,640.00	91.90	359.78	10,984.38	3,751.72	-346.69	3,761.75	1.44	1.24	-0.73
14,732.00	91.32	359.71	10,981.80	3,843.68	-347.10	3,853.67	0.64	-0.63	-0.08
14,826.00	90.20	0.25	10,980.55	3,937.67	-347.13	3,947.60	1.32	-1.19	0.57



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	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)
14,919.00	91.74	359.69	10,978.98	4,030.65	-347.18	4,040.52	1.76	1.66	-0.60
15,013.00	91.06	359.62	10,976.68	4,124.62	-347.75	4,134.45	0.73	-0.72	-0.07
15,107.00	89.27	359.27	10,976.41	4,218.62	-348.66	4,228.42	1.94	-1.90	-0.37
15,201.00	90.48	358.35	10,976.62	4,312.59	-350.61	4,322.40	1.62	1.29	-0.98
15,276.00	91.09	357.89	10,975.59	4,387.54	-353.07	4,397.39	1.02	0.81	-0.61
15,370.00	90.50	359.27	10,974.28	4,481.50	-355.40	4,491.38	1.60	-0.63	1.47
15,464.00	91.48	359.05	10,972.66	4,575.48	-356.78	4,585.34	1.07	1.04	-0.23
15,554.00	90.50	0.15	10,971.11	4,665.46	-357.40	4,675.29	1.64	-1.09	1.22
15,648.00	90.36	0.28	10,970.40	4,759.46	-357.05	4,769.21	0.20	-0.15	0.14
15,743.00	91.04	359.90	10,969.24	4,854.45	-356.90	4,864.14	0.82	0.72	-0.40
15,838.00	89.33	0.34	10,968.93	4,949.44	-356.70	4,959.06	1.86	-1.80	0.46
15,933.00	89.24	0.40	10,970.12	5,044.44	-356.09	5,053.97	0.11	-0.09	0.06
16,028.00	89.66	0.11	10,971.03	5,139.43	-355.67	5,148.89	0.54	0.44	-0.31
16,123.00	90.45	0.10	10,970.94	5,234.43	-355.49	5,243.82	0.83	0.83	-0.01
16,218.00	91.04	359.43	10,969.70	5,329.42	-355.88	5,338.76	0.94	0.62	-0.71
16,312.00	91.49	359.07	10,967.63	5,423.39	-357.11	5,432.71	0.61	0.48	-0.38
16,406.00	90.81	0.14	10,965.74	5,517.36	-357.76	5,526.65	1.35	-0.72	1.14
16,501.00	90.79	359.94	10,964.42	5,612.36	-357.69	5,621.58	0.21	-0.02	-0.21
16,594.00	89.50	0.48	10,964.18	5,705.35	-357.35	5,714.51	1.50	-1.39	0.58
16,688.00	90.48	359.98	10,964.20	5,799.35	-356.98	5,808.43	1.17	1.04	-0.53
16,782.00	90.92	359.50	10,963.05	5,893.34	-357.40	5,902.38	0.69	0.47	-0.51
16,877.00	89.72	0.46	10,962.52	5,988.34	-357.44	5,997.31	1.62	-1.26	1.01
16,973.00	90.34	359.91	10,962.47	6,084.34	-357.13	6,093.24	0.86	0.65	-0.57
17,068.00	90.92	359.44	10,961.42	6,179.33	-357.67	6,188.19	0.79	0.61	-0.49
17,163.00	89.47	359.95	10,961.10	6,274.32	-358.17	6,283.14	1.62	-1.53	0.54
17,258.00	89.41	0.12	10,962.03	6,369.32	-358.11	6,378.07	0.19	-0.06	0.18
17,353.00	90.06	359.79	10,962.47	6,464.32	-358.19	6,473.01	0.77	0.68	-0.35
17,447.00	88.93	359.73	10,963.30	6,558.31	-358.58	6,566.96	1.20	-1.20	-0.06
17,542.00	89.19	359.58	10,964.85	6,653.30	-359.15	6,661.90	0.32	0.27	-0.16
17,637.00	89.89	359.55	10,965.62	6,748.29	-359.87	6,756.86	0.74	0.74	-0.03
17,732.00	90.39	359.36	10,965.38	6,843.28	-360.78	6,851.83	0.56	0.53	-0.20
17,827.00	88.54	359.78	10,966.27	6,938.27	-361.49	6,946.78	2.00	-1.95	0.44
17,922.00	88.99	359.79	10,968.32	7,033.25	-361.85	7,041.71	0.47	0.47	0.01
18,016.00	89.52	359.62	10,969.54	7,127.24	-362.33	7,135.66	0.59	0.56	-0.18
18,110.00	90.14	359.29	10,969.82	7,221.24	-363.23	7,229.62	0.75	0.66	-0.35
18,203.00	90.56	359.34	10,969.25	7,314.23	-364.34	7,322.59	0.45	0.45	0.05
18,299.00	89.16	359.57	10,969.49	7,410.22	-365.25	7,418.56	1.48	-1.46	0.24
18,394.00	89.72	359.52	10,970.42	7,505.21	-366.00	7,513.52	0.59	0.59	-0.05
18,494.00	90.67	359.58	10,970.07	7,605.21	-366.79	7,613.47	0.95	0.95	0.06
18,588.00	91.41	359.54	10,968.37	7,699.19	-367.51	7,707.42	0.79	0.79	-0.04
18,682.00	90.56	359.50	10,966.75	7,793.17	-368.30	7,801.37	0.91	-0.90	-0.04
18,776.00	89.30	359.08	10,966.87	7,887.16	-369.46	7,895.34	1.41	-1.34	-0.45
18,870.00	87.02	359.39	10,969.89	7,981.10	-370.72	7,989.26	2.45	-2.43	0.33

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Com	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	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)
18,964.00	87.27	359.04	10,974.57	8,074.97	-372.00	8,083.12	0.46	0.27	-0.37
19,059.00	88.56	358.97	10,978.02	8,169.89	-373.65	8,178.04	1.36	1.36	-0.07
19,153.00	89.24	358.32	10,979.83	8,263.85	-375.88	8,272.02	1.00	0.72	-0.69
19,247.00	90.45	357.83	10,980.08	8,357.79	-379.03	8,366.01	1.39	1.29	-0.52
19,341.00	90.73	358.70	10,979.11	8,451.74	-381.88	8,460.01	0.97	0.30	0.93
19,435.00	89.50	358.90	10,978.93	8,545.72	-383.85	8,553.99	1.33	-1.31	0.21
19,529.00	88.90	359.45	10,980.24	8,639.70	-385.20	8,647.96	0.87	-0.64	0.59
19,623.00	88.65	0.21	10,982.25	8,733.68	-385.48	8,741.89	0.85	-0.27	0.81
19,717.00	89.35	0.07	10,983.89	8,827.66	-385.25	8,835.80	0.76	0.74	-0.15
19,811.00	90.96	359.33	10,983.63	8,921.66	-385.74	8,929.76	1.89	1.71	-0.79
19,905.00	89.45	359.87	10,983.30	9,015.65	-386.40	9,023.71	1.71	-1.61	0.57
20,000.00	88.79	0.84	10,984.76	9,110.64	-385.81	9,118.62	1.23	-0.69	1.02
20,094.00	90.32	359.89	10,985.49	9,204.63	-385.21	9,212.53	1.92	1.63	-1.01
20,188.00	88.59	359.07	10,986.38	9,298.62	-386.06	9,306.48	2.04	-1.84	-0.87
20,282.00	89.30	358.10	10,988.11	9,392.57	-388.39	9,400.46	1.28	0.76	-1.03
20,377.00	90.30	356.73	10,988.44	9,487.47	-392.67	9,495.45	1.79	1.05	-1.44
20,471.00	89.56	357.26	10,988.56	9,581.34	-397.60	9,589.44	0.97	-0.79	0.56
20,565.00	88.47	358.09	10,990.17	9,675.25	-401.41	9,683.42	1.46	-1.16	0.88
20,659.00	88.24	359.72	10,992.87	9,769.19	-403.21	9,777.36	1.75	-0.24	1.73
20,752.00	89.67	1.72	10,994.57	9,862.16	-402.04	9,870.23	2.64	1.54	2.15
20,846.00	91.50	1.59	10,993.61	9,956.11	-399.32	9,964.03	1.95	1.95	-0.14
20,940.00	91.24	1.75	10,991.36	10,050.04	-396.58	10,057.80	0.32	-0.28	0.17
21,034.00	91.30	1.71	10,989.28	10,143.98	-393.75	10,151.57	0.08	0.06	-0.04
21,126.00	92.24	1.39	10,986.44	10,235.90	-391.26	10,243.35	1.08	1.02	-0.35
21,220.00	93.01	1.17	10,982.13	10,329.77	-389.16	10,337.09	0.85	0.82	-0.23
21,255.68	93.36	1.09	10,980.15	10,365.39	-388.46	10,372.66	1.00	0.98	-0.22
LTP: 21255.68' MD									
21,318.00	93.97	0.95	10,976.17	10,427.57	-387.35	10,434.76	1.00	0.98	-0.22
Final Phoenix MWD Survey									
21,385.00	93.97	0.95	10,971.53	10,494.40	-386.24	10,501.51	0.00	0.00	0.00
Projection to TD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,290.00	10,277.61	-118.96	-290.30	Tie In
10,290.00	10,277.61	-118.96	-290.30	Tie In
10,332.00	10,319.61	-118.80	-290.61	First Phoenix MWD Survey
11,358.38	11,025.97	473.59	-304.40	FTP: 11358.38' MD
21,255.68	10,980.15	10,365.39	-388.46	LTP: 21255.68' MD
21,318.00	10,976.17	10,427.57	-387.35	Final Phoenix MWD Survey
21,385.00	10,971.53	10,494.40	-386.24	Projection to TD

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 502H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3788.80usft (Ensign 155)
Site:	Huckleberry State Corn	MD Reference:	RKB @ 3788.80usft (Ensign 155)
Well:	502H	North Reference:	Grid
Wellbore:	OH / 64200	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass