



PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)

Boone 16 State Com

4H

OH / 64760

Design: Surveys (Scan Drill Quest)

Standard Survey Report

14 June, 2019

HOBBS OCD
DEC 16 2019
RECEIVED





Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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	Boone 16 State Com				
Site Position:		Northing:	535,657.10 usft	Latitude:	32° 28' 13.4378 N
From:	Map	Easting:	731,276.50 usft	Longitude:	103° 35' 0.3218 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.40 °

Well	4H				
Well Position	+N/-S	0.00 usft	Northing:	535,657.10 usft	Latitude: 32° 28' 13.4378 N
	+E/-W	0.00 usft	Easting:	731,276.50 usft	Longitude: 103° 35' 0.3218 W
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level: 3,741.00 usft

Wellbore	OH / 64760				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	5/15/2019	6.65	60.28	48,130.30016727

Design	Surveys (Scan Drill Quest)				
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	359.52	

Survey Program	Date 6/14/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	10,994.00	SDI Gyros (OH / 64760)	Scientific Keeper	Scientific Drilling Intl. Standard Wireline Keeper
11,169.00	22,400.00	Phoenix MWD Surveys (OH / 64760)	MWD+HRGM	OWSG MWD + HRGM

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	0.21	111.91	100.00	-0.07	0.17	-0.07	0.21	0.21	0.00	
125.00	0.17	54.22	125.00	-0.06	0.24	-0.07	0.75	-0.16	-230.76	
150.00	0.11	96.20	150.00	-0.04	0.30	-0.05	0.46	-0.24	167.92	
175.00	0.18	116.83	175.00	-0.07	0.36	-0.07	0.35	0.28	82.52	
200.00	0.18	106.40	200.00	-0.09	0.43	-0.10	0.13	0.00	-41.72	
225.00	0.47	144.58	225.00	-0.19	0.53	-0.19	1.39	1.16	152.72	
250.00	0.29	110.61	250.00	-0.29	0.64	-0.30	1.12	-0.72	-135.88	
275.00	0.26	91.43	275.00	-0.32	0.76	-0.32	0.39	-0.12	-76.72	
300.00	0.31	106.45	300.00	-0.34	0.88	-0.35	0.36	0.20	60.08	



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Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Corn	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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)
325.00	0.26	96.89	325.00	-0.36	1.00	-0.37	0.28	-0.20	-38.24
350.00	0.23	92.03	350.00	-0.37	1.11	-0.38	0.15	-0.12	-19.44
375.00	0.23	107.20	375.00	-0.39	1.21	-0.40	0.24	0.00	60.68
400.00	0.26	105.43	400.00	-0.42	1.31	-0.43	0.12	0.12	-7.08
425.00	0.27	111.48	425.00	-0.46	1.42	-0.47	0.12	0.04	24.20
450.00	0.40	113.15	450.00	-0.51	1.55	-0.53	0.52	0.52	6.68
475.00	0.40	96.13	475.00	-0.56	1.72	-0.57	0.47	0.00	-68.08
500.00	0.40	98.15	499.99	-0.58	1.89	-0.59	0.06	0.00	8.08
525.00	0.46	105.59	524.99	-0.62	2.08	-0.63	0.33	0.24	29.76
550.00	0.36	82.59	549.99	-0.63	2.25	-0.65	0.76	-0.40	-92.00
575.00	0.33	42.10	574.99	-0.57	2.38	-0.59	0.96	-0.12	-161.96
600.00	0.31	101.24	599.99	-0.53	2.49	-0.55	1.27	-0.08	236.56
625.00	0.30	98.33	624.99	-0.55	2.62	-0.57	0.07	-0.04	-11.64
650.00	0.33	96.99	649.99	-0.57	2.76	-0.59	0.12	0.12	-5.36
675.00	0.29	105.67	674.99	-0.60	2.89	-0.62	0.25	-0.16	34.72
700.00	0.32	96.75	699.99	-0.62	3.02	-0.65	0.22	0.12	-35.68
725.00	0.36	106.22	724.99	-0.65	3.17	-0.68	0.28	0.16	37.88
750.00	0.41	93.49	749.99	-0.68	3.33	-0.71	0.40	0.20	-50.92
775.00	0.32	90.56	774.99	-0.69	3.49	-0.71	0.37	-0.36	-11.72
800.00	0.37	81.14	799.99	-0.67	3.64	-0.70	0.30	0.20	-37.68
825.00	0.32	64.25	824.99	-0.63	3.78	-0.66	0.45	-0.20	-67.56
850.00	0.30	56.49	849.99	-0.56	3.90	-0.60	0.19	-0.08	-31.04
875.00	0.27	57.47	874.99	-0.50	4.01	-0.53	0.12	-0.12	3.92
900.00	0.31	70.51	899.99	-0.44	4.12	-0.48	0.31	0.16	52.16
925.00	0.31	69.77	924.99	-0.40	4.25	-0.43	0.02	0.00	-2.96
950.00	0.26	75.80	949.99	-0.36	4.36	-0.40	0.23	-0.20	24.12
975.00	0.39	67.84	974.99	-0.31	4.50	-0.35	0.55	0.52	-31.84
1,000.00	0.47	54.60	999.99	-0.22	4.66	-0.26	0.51	0.32	-52.96
1,025.00	0.38	57.74	1,024.99	-0.12	4.81	-0.16	0.37	-0.36	12.56
1,050.00	0.45	57.71	1,049.98	-0.02	4.97	-0.06	0.28	0.28	-0.12
1,075.00	0.50	45.84	1,074.98	0.11	5.13	0.06	0.44	0.20	-47.48
1,100.00	0.50	47.81	1,099.98	0.26	5.29	0.21	0.07	0.00	7.88
1,125.00	0.60	52.92	1,124.98	0.41	5.47	0.36	0.45	0.40	20.44
1,150.00	0.59	48.25	1,149.98	0.57	5.67	0.53	0.20	-0.04	-18.68
1,175.00	0.69	53.95	1,174.98	0.75	5.89	0.70	0.47	0.40	22.80
1,200.00	0.70	53.45	1,199.98	0.93	6.14	0.88	0.05	0.04	-2.00
1,225.00	0.74	55.43	1,224.98	1.11	6.39	1.06	0.19	0.16	7.92
1,250.00	0.88	55.64	1,249.97	1.31	6.68	1.25	0.56	0.56	0.84
1,275.00	0.79	59.95	1,274.97	1.50	6.99	1.45	0.44	-0.36	17.24
1,300.00	0.83	54.75	1,299.97	1.69	7.29	1.63	0.33	0.16	-20.80
1,325.00	0.78	51.99	1,324.97	1.90	7.57	1.84	0.25	-0.20	-11.04
1,350.00	0.74	66.16	1,349.96	2.07	7.85	2.01	0.77	-0.16	56.68
1,375.00	0.72	54.59	1,374.96	2.23	8.13	2.16	0.59	-0.08	-46.28



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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	0.64	50.95	1,399.96	2.41	8.36	2.34	0.36	-0.32	-14.56
1,425.00	0.68	47.56	1,424.96	2.60	8.58	2.53	0.22	0.16	-13.56
1,450.00	0.64	51.91	1,449.96	2.78	8.80	2.71	0.26	-0.16	17.40
1,475.00	0.64	53.06	1,474.95	2.95	9.02	2.88	0.05	0.00	4.60
1,500.00	0.66	55.30	1,499.95	3.12	9.25	3.04	0.13	0.08	8.96
1,525.00	0.63	61.40	1,524.95	3.27	9.49	3.19	0.30	-0.12	24.40
1,550.00	0.56	56.55	1,549.95	3.40	9.71	3.32	0.34	-0.28	-19.40
1,575.00	0.58	53.91	1,574.95	3.54	9.92	3.46	0.13	0.08	-10.56
1,600.00	0.63	55.95	1,599.95	3.69	10.13	3.61	0.22	0.20	8.16
1,625.00	0.72	50.18	1,624.95	3.87	10.37	3.78	0.45	0.36	-23.08
1,650.00	0.73	56.69	1,649.94	4.06	10.62	3.97	0.33	0.04	26.04
1,675.00	0.73	56.24	1,674.94	4.24	10.89	4.14	0.02	0.00	-1.80
1,700.00	0.70	57.08	1,699.94	4.41	11.15	4.31	0.13	-0.12	3.36
1,725.00	0.65	69.31	1,724.94	4.54	11.41	4.44	0.61	-0.20	48.92
1,750.00	0.63	60.34	1,749.94	4.66	11.66	4.56	0.41	-0.08	-35.88
1,775.00	0.62	64.01	1,774.93	4.79	11.90	4.69	0.17	-0.04	14.68
1,800.00	0.65	56.38	1,799.93	4.92	12.14	4.82	0.36	0.12	-30.52
1,825.00	0.73	70.04	1,824.93	5.06	12.41	4.95	0.73	0.32	54.64
1,850.00	0.77	68.42	1,849.93	5.17	12.72	5.07	0.18	0.16	-6.48
1,875.00	0.82	67.12	1,874.93	5.30	13.04	5.19	0.21	0.20	-5.20
1,900.00	0.81	74.74	1,899.92	5.42	13.37	5.31	0.44	-0.04	30.48
1,925.00	0.72	76.43	1,924.92	5.50	13.69	5.39	0.37	-0.36	6.76
1,950.00	0.79	83.39	1,949.92	5.56	14.02	5.44	0.46	0.28	27.84
1,975.00	0.76	81.74	1,974.92	5.60	14.35	5.48	0.15	-0.12	-6.60
2,000.00	0.86	87.98	1,999.92	5.63	14.71	5.51	0.53	0.40	24.96
2,025.00	0.79	84.21	2,024.91	5.66	15.06	5.53	0.35	-0.28	-15.08
2,050.00	0.75	97.48	2,049.91	5.65	15.40	5.53	0.73	-0.16	53.08
2,075.00	0.70	116.46	2,074.91	5.56	15.70	5.43	0.98	-0.20	75.92
2,100.00	0.81	141.46	2,099.91	5.36	15.94	5.23	1.38	0.44	100.00
2,125.00	0.93	158.53	2,124.90	5.03	16.13	4.90	1.14	0.48	68.28
2,150.00	1.30	188.07	2,149.90	4.56	16.16	4.43	2.69	1.48	118.16
2,175.00	1.66	194.44	2,174.89	3.93	16.03	3.80	1.58	1.44	25.48
2,200.00	1.83	202.25	2,199.88	3.21	15.79	3.08	1.17	0.68	31.24
2,225.00	2.22	206.07	2,224.86	2.41	15.43	2.28	1.65	1.56	15.28
2,250.00	2.77	207.01	2,249.84	1.43	14.94	1.31	2.21	2.20	3.76
2,275.00	3.18	208.31	2,274.81	0.28	14.34	0.16	1.66	1.64	5.20
2,300.00	3.63	206.94	2,299.76	-1.03	13.65	-1.15	1.83	1.80	-5.48
2,325.00	4.09	208.89	2,324.70	-2.52	12.86	-2.63	1.91	1.84	7.80
2,350.00	4.47	209.91	2,349.63	-4.14	11.94	-4.24	1.55	1.52	4.08
2,375.00	4.88	209.95	2,374.55	-5.91	10.93	-6.00	1.64	1.64	0.16
2,400.00	4.96	211.61	2,399.46	-7.75	9.83	-7.83	0.65	0.32	6.64
2,425.00	5.04	211.46	2,424.36	-9.61	8.69	-9.68	0.32	0.32	-0.60
2,450.00	5.09	212.19	2,449.27	-11.48	7.53	-11.55	0.33	0.20	2.92



Survey Report



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Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	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)
2,475.00	5.10	213.12	2,474.17	-13.35	6.33	-13.40	0.33	0.04	3.72
2,500.00	4.82	215.86	2,499.07	-15.13	5.11	-15.18	1.47	-1.12	10.96
2,525.00	4.66	219.74	2,523.99	-16.77	3.84	-16.80	1.43	-0.64	15.52
2,550.00	4.67	220.28	2,548.91	-18.32	2.53	-18.34	0.18	0.04	2.16
2,575.00	4.62	219.79	2,573.82	-19.87	1.23	-19.88	0.26	-0.20	-1.96
2,600.00	4.47	221.19	2,598.75	-21.38	-0.05	-21.38	0.75	-0.60	5.60
2,625.00	3.83	227.82	2,623.68	-22.67	-1.31	-22.66	3.20	-2.56	26.52
2,650.00	3.46	232.67	2,648.63	-23.69	-2.53	-23.67	1.93	-1.48	19.40
2,675.00	3.29	237.06	2,673.59	-24.54	-3.74	-24.51	1.24	-0.68	17.56
2,700.00	3.07	241.25	2,698.55	-25.25	-4.92	-25.21	1.28	-0.88	16.76
2,725.00	2.63	249.37	2,723.52	-25.78	-6.05	-25.73	2.38	-1.76	32.48
2,750.00	2.19	261.47	2,748.49	-26.05	-7.06	-25.99	2.68	-1.76	48.40
2,775.00	1.98	271.95	2,773.48	-26.11	-7.96	-26.04	1.74	-0.84	41.92
2,800.00	1.92	288.51	2,798.46	-25.96	-8.79	-25.88	2.26	-0.24	66.24
2,825.00	1.99	307.31	2,823.45	-25.56	-9.53	-25.48	2.57	0.28	75.20
2,850.00	2.11	321.77	2,848.43	-24.94	-10.16	-24.85	2.12	0.48	57.84
2,875.00	2.42	335.11	2,873.41	-24.10	-10.67	-24.01	2.44	1.24	53.36
2,900.00	2.60	343.76	2,898.39	-23.07	-11.05	-22.98	1.68	0.72	34.60
2,925.00	2.85	349.06	2,923.36	-21.92	-11.33	-21.82	1.42	1.00	21.20
2,950.00	2.99	353.20	2,948.33	-20.66	-11.52	-20.56	1.01	0.56	16.56
2,975.00	3.42	357.21	2,973.29	-19.27	-11.64	-19.17	1.94	1.72	16.04
3,000.00	3.57	6.16	2,998.24	-17.75	-11.59	-17.65	2.26	0.60	35.80
3,025.00	3.66	10.21	3,023.19	-16.19	-11.36	-16.10	1.08	0.36	16.20
3,050.00	3.78	12.84	3,048.14	-14.60	-11.04	-14.51	0.83	0.48	10.52
3,075.00	3.83	15.84	3,073.09	-13.00	-10.63	-12.91	0.82	0.20	12.00
3,100.00	3.66	23.63	3,098.03	-11.46	-10.08	-11.38	2.14	-0.68	31.16
3,125.00	3.55	29.80	3,122.98	-10.06	-9.37	-9.98	1.61	-0.44	24.68
3,150.00	3.47	32.50	3,147.94	-8.75	-8.58	-8.68	0.73	-0.32	10.80
3,175.00	3.46	39.28	3,172.89	-7.53	-7.70	-7.46	1.64	-0.04	27.12
3,200.00	3.43	44.83	3,197.85	-6.41	-6.69	-6.36	1.34	-0.12	22.20
3,225.00	3.34	48.57	3,222.80	-5.40	-5.62	-5.35	0.95	-0.36	14.96
3,250.00	3.35	50.52	3,247.76	-4.45	-4.51	-4.42	0.46	0.04	7.80
3,275.00	3.28	54.23	3,272.72	-3.57	-3.37	-3.54	0.90	-0.28	14.84
3,300.00	3.25	59.39	3,297.68	-2.79	-2.18	-2.77	1.18	-0.12	20.64
3,325.00	3.09	63.02	3,322.64	-2.13	-0.97	-2.12	1.03	-0.64	14.52
3,350.00	3.06	63.75	3,347.60	-1.53	0.23	-1.53	0.20	-0.12	2.92
3,375.00	3.05	63.21	3,372.57	-0.93	1.42	-0.94	0.12	-0.04	-2.16
3,400.00	3.06	63.21	3,397.53	-0.33	2.61	-0.35	0.04	0.04	0.00
3,425.00	3.14	63.97	3,422.50	0.27	3.82	0.24	0.36	0.32	3.04
3,450.00	3.12	64.37	3,447.46	0.87	5.05	0.82	0.12	-0.08	1.60
3,475.00	3.17	66.02	3,472.42	1.44	6.30	1.39	0.41	0.20	6.60
3,500.00	3.25	66.09	3,497.38	2.01	7.58	1.95	0.32	0.32	0.28
3,525.00	3.33	65.75	3,522.34	2.59	8.89	2.52	0.33	0.32	-1.36
3,550.00	3.36	66.36	3,547.30	3.19	10.22	3.10	0.19	0.12	2.44

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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)
3,575.00	3.38	66.69	3,572.26	3.77	11.57	3.68	0.11	0.08	1.32
3,600.00	3.37	67.16	3,597.21	4.35	12.92	4.24	0.12	-0.04	1.88
3,625.00	3.11	66.81	3,622.17	4.90	14.22	4.78	1.04	-1.04	-1.40
3,650.00	2.74	68.98	3,647.14	5.38	15.40	5.25	1.54	-1.48	8.68
3,675.00	2.11	71.96	3,672.12	5.74	16.40	5.60	2.57	-2.52	11.92
3,700.00	1.85	72.40	3,697.10	6.00	17.22	5.86	1.04	-1.04	1.76
3,725.00	1.65	76.47	3,722.09	6.21	17.96	6.06	0.94	-0.80	16.28
3,750.00	1.14	84.42	3,747.08	6.32	18.55	6.16	2.18	-2.04	31.80
3,775.00	0.71	103.51	3,772.08	6.31	18.95	6.15	2.09	-1.72	76.36
3,800.00	0.57	125.56	3,797.08	6.20	19.20	6.04	1.12	-0.56	88.20
3,825.00	0.54	151.59	3,822.08	6.02	19.36	5.86	1.01	-0.12	104.12
3,850.00	0.82	192.38	3,847.08	5.74	19.38	5.58	2.17	1.12	163.16
3,875.00	1.16	202.13	3,872.07	5.33	19.24	5.17	1.51	1.36	39.00
3,900.00	1.51	211.29	3,897.06	4.82	18.98	4.66	1.64	1.40	36.64
3,925.00	1.78	210.50	3,922.05	4.20	18.61	4.05	1.08	1.08	-3.16
3,950.00	2.12	212.47	3,947.04	3.48	18.16	3.33	1.39	1.36	7.88
3,975.00	2.26	213.50	3,972.02	2.68	17.64	2.53	0.58	0.56	4.12
4,000.00	2.28	215.48	3,997.00	1.86	17.08	1.72	0.32	0.08	7.92
4,025.00	2.40	213.21	4,021.98	1.02	16.51	0.88	0.61	0.48	-9.08
4,050.00	2.33	215.45	4,046.96	0.17	15.93	0.03	0.46	-0.28	8.96
4,075.00	2.37	213.93	4,071.94	-0.68	15.34	-0.80	0.30	0.16	-6.08
4,100.00	2.46	213.53	4,096.92	-1.55	14.76	-1.68	0.37	0.36	-1.60
4,125.00	2.51	215.01	4,121.89	-2.45	14.15	-2.57	0.33	0.20	5.92
4,150.00	2.36	214.53	4,146.87	-3.32	13.54	-3.43	0.61	-0.60	-1.92
4,175.00	2.43	214.38	4,171.85	-4.18	12.95	-4.29	0.28	0.28	-0.60
4,200.00	2.42	214.83	4,196.83	-5.05	12.35	-5.16	0.09	-0.04	1.80
4,225.00	2.42	215.17	4,221.80	-5.92	11.75	-6.02	0.06	0.00	1.36
4,250.00	2.49	215.81	4,246.78	-6.79	11.12	-6.88	0.30	0.28	2.56
4,275.00	2.56	215.58	4,271.76	-7.68	10.48	-7.77	0.28	0.28	-0.92
4,300.00	2.62	214.95	4,296.73	-8.61	9.83	-8.69	0.27	0.24	-2.52
4,325.00	2.76	214.24	4,321.70	-9.57	9.16	-9.65	0.58	0.56	-2.84
4,350.00	2.97	215.49	4,346.67	-10.60	8.45	-10.67	0.88	0.84	5.00
4,375.00	3.14	214.01	4,371.64	-11.69	7.69	-11.76	0.75	0.68	-5.92
4,400.00	3.36	212.76	4,396.60	-12.88	6.91	-12.93	0.92	0.88	-5.00
4,425.00	3.42	212.68	4,421.55	-14.12	6.11	-14.17	0.24	0.24	-0.32
4,450.00	3.75	212.49	4,446.50	-15.44	5.27	-15.48	1.32	1.32	-0.76
4,475.00	3.94	212.03	4,471.45	-16.85	4.37	-16.89	0.77	0.76	-1.84
4,500.00	4.18	211.93	4,496.38	-18.36	3.44	-18.38	0.96	0.96	-0.40
4,525.00	4.20	211.04	4,521.32	-19.91	2.48	-19.93	0.27	0.08	-3.56
4,550.00	4.20	211.57	4,546.25	-21.48	1.53	-21.49	0.16	0.00	2.12
4,575.00	4.18	212.04	4,571.18	-23.03	0.57	-23.03	0.16	-0.08	1.88
4,600.00	4.08	211.78	4,596.12	-24.56	-0.38	-24.55	0.41	-0.40	-1.04
4,625.00	3.84	211.87	4,621.06	-26.03	-1.29	-26.01	0.96	-0.96	0.36



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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)
4,650.00	3.59	211.01	4,646.01	-27.41	-2.14	-27.39	1.02	-1.00	-3.44
4,675.00	3.35	211.61	4,670.96	-28.70	-2.92	-28.67	0.97	-0.96	2.40
4,700.00	2.85	211.09	4,695.92	-29.85	-3.63	-29.82	2.00	-2.00	-2.08
4,725.00	2.44	213.96	4,720.90	-30.83	-4.25	-30.79	1.72	-1.64	11.48
4,750.00	2.20	215.52	4,745.88	-31.66	-4.82	-31.62	0.99	-0.96	6.24
4,775.00	1.86	215.16	4,770.86	-32.38	-5.33	-32.34	1.36	-1.36	-1.44
4,800.00	1.25	219.75	4,795.85	-32.92	-5.74	-32.87	2.49	-2.44	18.36
4,825.00	1.05	227.51	4,820.85	-33.29	-6.09	-33.24	1.01	-0.80	31.04
4,850.00	0.86	230.27	4,845.84	-33.56	-6.40	-33.51	0.78	-0.76	11.04
4,875.00	0.50	263.57	4,870.84	-33.69	-6.65	-33.64	2.08	-1.44	133.20
4,900.00	0.45	319.03	4,895.84	-33.63	-6.82	-33.57	1.78	-0.20	221.84
4,925.00	0.53	333.94	4,920.84	-33.45	-6.94	-33.40	0.60	0.32	59.64
4,950.00	0.63	337.29	4,945.84	-33.22	-7.04	-33.16	0.42	0.40	13.40
4,975.00	0.57	342.54	4,970.84	-32.98	-7.13	-32.92	0.33	-0.24	21.00
5,000.00	0.64	343.81	4,995.84	-32.73	-7.21	-32.67	0.29	0.28	5.08
5,025.00	0.63	349.36	5,020.83	-32.46	-7.27	-32.40	0.25	-0.04	22.20
5,050.00	0.62	344.55	5,045.83	-32.19	-7.34	-32.13	0.21	-0.04	-19.24
5,075.00	0.67	350.37	5,070.83	-31.92	-7.40	-31.85	0.33	0.20	23.28
5,100.00	0.55	356.47	5,095.83	-31.65	-7.43	-31.59	0.55	-0.48	24.40
5,125.00	0.58	354.08	5,120.83	-31.41	-7.45	-31.34	0.15	0.12	-9.56
5,150.00	0.60	356.44	5,145.83	-31.15	-7.47	-31.09	0.13	0.08	9.44
5,175.00	0.59	357.96	5,170.83	-30.89	-7.48	-30.83	0.07	-0.04	6.08
5,200.00	0.56	353.08	5,195.83	-30.64	-7.50	-30.58	0.23	-0.12	-19.52
5,225.00	0.70	0.42	5,220.82	-30.37	-7.52	-30.30	0.65	0.56	29.36
5,250.00	0.57	358.01	5,245.82	-30.09	-7.52	-30.03	0.53	-0.52	-9.64
5,275.00	0.59	5.65	5,270.82	-29.84	-7.51	-29.77	0.32	0.08	30.56
5,300.00	0.58	6.31	5,295.82	-29.58	-7.48	-29.52	0.05	-0.04	2.64
5,325.00	0.64	3.05	5,320.82	-29.32	-7.46	-29.26	0.28	0.24	-13.04
5,350.00	0.65	1.24	5,345.82	-29.04	-7.45	-28.98	0.09	0.04	-7.24
5,375.00	0.63	2.31	5,370.81	-28.76	-7.44	-28.70	0.09	-0.08	4.28
5,400.00	0.58	8.39	5,395.81	-28.50	-7.42	-28.43	0.33	-0.20	24.32
5,425.00	0.60	7.66	5,420.81	-28.24	-7.38	-28.18	0.09	0.08	-2.92
5,450.00	0.57	14.16	5,445.81	-27.99	-7.34	-27.93	0.29	-0.12	26.00
5,475.00	0.60	22.23	5,470.81	-27.75	-7.26	-27.69	0.35	0.12	32.28
5,500.00	0.57	17.35	5,495.81	-27.51	-7.17	-27.45	0.23	-0.12	-19.52
5,525.00	0.54	17.20	5,520.81	-27.28	-7.10	-27.22	0.12	-0.12	-0.60
5,550.00	0.57	13.95	5,545.81	-27.05	-7.03	-26.99	0.17	0.12	-13.00
5,575.00	0.60	12.15	5,570.80	-26.80	-6.97	-26.74	0.14	0.12	-7.20
5,600.00	0.60	9.71	5,595.80	-26.54	-6.93	-26.48	0.10	0.00	-9.76
5,625.00	0.53	23.64	5,620.80	-26.30	-6.86	-26.25	0.61	-0.28	55.72
5,650.00	0.52	27.59	5,645.80	-26.10	-6.76	-26.04	0.15	-0.04	15.80
5,675.00	0.52	28.33	5,670.80	-25.90	-6.65	-25.84	0.03	0.00	2.96
5,700.00	0.59	27.75	5,695.80	-25.68	-6.54	-25.63	0.28	0.28	-2.32

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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	0.79	13.88	5,720.80	-25.40	-6.44	-25.35	1.04	0.80	-55.48
5,750.00	0.72	13.91	5,745.79	-25.08	-6.36	-25.03	0.28	-0.28	0.12
5,775.00	0.84	15.45	5,770.79	-24.75	-6.27	-24.70	0.49	0.48	6.16
5,800.00	0.85	11.30	5,795.79	-24.40	-6.19	-24.34	0.25	0.04	-16.60
5,825.00	0.96	12.69	5,820.79	-24.01	-6.10	-23.96	0.45	0.44	5.56
5,850.00	0.95	13.76	5,845.78	-23.60	-6.01	-23.55	0.08	-0.04	4.28
5,875.00	1.03	15.61	5,870.78	-23.19	-5.90	-23.14	0.34	0.32	7.40
5,900.00	0.98	14.27	5,895.78	-22.76	-5.79	-22.71	0.22	-0.20	-5.36
5,925.00	1.05	16.53	5,920.77	-22.34	-5.67	-22.29	0.32	0.28	9.04
5,950.00	1.03	13.43	5,945.77	-21.90	-5.55	-21.85	0.24	-0.08	-12.40
5,975.00	1.01	15.68	5,970.76	-21.47	-5.44	-21.42	0.18	-0.08	9.00
6,000.00	1.09	16.59	5,995.76	-21.03	-5.31	-20.98	0.33	0.32	3.64
6,025.00	1.11	17.54	6,020.75	-20.57	-5.17	-20.52	0.11	0.08	3.80
6,050.00	1.17	15.74	6,045.75	-20.09	-5.03	-20.05	0.28	0.24	-7.20
6,075.00	1.23	17.46	6,070.74	-19.59	-4.88	-19.55	0.28	0.24	6.88
6,100.00	1.22	15.82	6,095.74	-19.08	-4.72	-19.04	0.15	-0.04	-6.56
6,125.00	1.22	16.83	6,120.73	-18.57	-4.58	-18.53	0.09	0.00	4.04
6,150.00	1.28	15.75	6,145.73	-18.04	-4.42	-18.01	0.26	0.24	-4.32
6,175.00	1.23	16.47	6,170.72	-17.52	-4.27	-17.48	0.21	-0.20	2.88
6,200.00	1.26	14.72	6,195.72	-16.99	-4.12	-16.96	0.19	0.12	-7.00
6,225.00	1.24	15.37	6,220.71	-16.47	-3.98	-16.43	0.10	-0.08	2.60
6,250.00	1.29	16.73	6,245.70	-15.94	-3.83	-15.90	0.23	0.20	5.44
6,275.00	1.33	16.02	6,270.70	-15.39	-3.67	-15.36	0.17	0.16	-2.84
6,300.00	1.33	15.58	6,295.69	-14.83	-3.51	-14.80	0.04	0.00	-1.76
6,325.00	1.33	17.11	6,320.68	-14.27	-3.35	-14.25	0.14	0.00	6.12
6,350.00	1.36	14.42	6,345.68	-13.71	-3.19	-13.68	0.28	0.12	-10.76
6,375.00	1.38	17.33	6,370.67	-13.13	-3.03	-13.11	0.29	0.08	11.64
6,400.00	1.32	17.40	6,395.66	-12.57	-2.85	-12.55	0.24	-0.24	0.28
6,425.00	1.31	15.62	6,420.66	-12.02	-2.69	-12.00	0.17	-0.04	-7.12
6,450.00	1.37	17.03	6,445.65	-11.46	-2.52	-11.44	0.27	0.24	5.64
6,475.00	1.31	16.50	6,470.64	-10.90	-2.35	-10.88	0.25	-0.24	-2.12
6,500.00	1.35	17.64	6,495.64	-10.35	-2.18	-10.33	0.19	0.16	4.56
6,525.00	1.38	16.53	6,520.63	-9.78	-2.01	-9.76	0.16	0.12	-4.44
6,550.00	1.39	15.84	6,545.62	-9.20	-1.84	-9.18	0.08	0.04	-2.76
6,575.00	1.36	16.19	6,570.61	-8.62	-1.67	-8.61	0.12	-0.12	1.40
6,600.00	1.36	16.10	6,595.61	-8.05	-1.51	-8.04	0.01	0.00	-0.36
6,625.00	1.37	17.07	6,620.60	-7.48	-1.34	-7.47	0.10	0.04	3.88
6,650.00	1.22	14.73	6,645.59	-6.94	-1.18	-6.93	0.64	-0.60	-9.36
6,675.00	0.76	2.61	6,670.59	-6.51	-1.11	-6.50	2.01	-1.84	-48.48
6,700.00	0.69	4.21	6,695.59	-6.20	-1.09	-6.19	0.29	-0.28	6.40
6,725.00	0.61	356.29	6,720.59	-5.92	-1.09	-5.91	0.48	-0.32	-31.68
6,750.00	0.58	358.86	6,745.58	-5.66	-1.10	-5.65	0.16	-0.12	10.28
6,775.00	0.63	358.66	6,770.58	-5.39	-1.10	-5.38	0.20	0.20	-0.80
6,800.00	0.53	356.40	6,795.58	-5.14	-1.11	-5.13	0.41	-0.40	-9.04



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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	0.58	358.59	6,820.58	-4.90	-1.13	-4.89	0.22	0.20	8.76
6,850.00	0.57	354.35	6,845.58	-4.65	-1.14	-4.64	0.17	-0.04	-16.96
6,875.00	0.59	359.11	6,870.58	-4.39	-1.15	-4.38	0.21	0.08	19.04
6,900.00	0.56	354.37	6,895.58	-4.14	-1.17	-4.13	0.22	-0.12	-18.96
6,925.00	0.50	1.07	6,920.58	-3.91	-1.18	-3.90	0.34	-0.24	26.80
6,950.00	0.44	357.75	6,945.57	-3.71	-1.18	-3.70	0.26	-0.24	-13.28
6,975.00	0.36	354.00	6,970.57	-3.53	-1.19	-3.52	0.34	-0.32	-15.00
7,000.00	0.38	346.91	6,995.57	-3.38	-1.22	-3.37	0.20	0.08	-28.36
7,025.00	0.32	350.15	7,020.57	-3.23	-1.25	-3.22	0.25	-0.24	12.96
7,050.00	0.32	354.09	7,045.57	-3.09	-1.27	-3.08	0.09	0.00	15.76
7,075.00	0.31	357.01	7,070.57	-2.95	-1.28	-2.94	0.08	-0.04	11.68
7,100.00	0.31	351.97	7,095.57	-2.82	-1.29	-2.81	0.11	0.00	-20.16
7,125.00	0.29	345.60	7,120.57	-2.69	-1.32	-2.68	0.16	-0.08	-25.48
7,150.00	0.22	338.41	7,145.57	-2.58	-1.35	-2.57	0.31	-0.28	-28.76
7,175.00	0.21	358.90	7,170.57	-2.49	-1.37	-2.48	0.31	-0.04	81.96
7,200.00	0.16	350.18	7,195.57	-2.41	-1.38	-2.40	0.23	-0.20	-34.88
7,225.00	0.22	343.33	7,220.57	-2.33	-1.40	-2.32	0.26	0.24	-27.40
7,250.00	0.22	354.61	7,245.57	-2.24	-1.41	-2.23	0.17	0.00	45.12
7,275.00	0.20	342.52	7,270.57	-2.15	-1.43	-2.14	0.19	-0.08	-48.36
7,300.00	0.18	356.44	7,295.57	-2.07	-1.45	-2.06	0.20	-0.08	55.68
7,325.00	0.17	357.30	7,320.57	-1.99	-1.45	-1.98	0.04	-0.04	3.44
7,350.00	0.17	340.02	7,345.57	-1.92	-1.47	-1.91	0.20	0.00	-69.12
7,375.00	0.07	301.84	7,370.57	-1.88	-1.49	-1.86	0.49	-0.40	-152.72
7,400.00	0.10	313.26	7,395.57	-1.85	-1.52	-1.84	0.14	0.12	45.68
7,425.00	0.07	259.87	7,420.57	-1.84	-1.55	-1.83	0.32	-0.12	-213.56
7,450.00	0.10	256.29	7,445.57	-1.85	-1.59	-1.84	0.12	0.12	-14.32
7,475.00	0.13	250.20	7,470.57	-1.86	-1.64	-1.85	0.13	0.12	-24.36
7,500.00	0.09	288.90	7,495.57	-1.87	-1.68	-1.85	0.33	-0.16	154.80
7,525.00	0.10	291.96	7,520.57	-1.85	-1.72	-1.84	0.04	0.04	12.24
7,550.00	0.09	252.92	7,545.57	-1.85	-1.76	-1.84	0.26	-0.04	-156.16
7,575.00	0.15	245.71	7,570.57	-1.87	-1.81	-1.85	0.25	0.24	-28.84
7,600.00	0.14	277.45	7,595.57	-1.88	-1.87	-1.86	0.32	-0.04	126.96
7,625.00	0.14	257.79	7,620.57	-1.88	-1.93	-1.87	0.19	0.00	-78.64
7,650.00	0.14	253.49	7,645.57	-1.90	-1.99	-1.88	0.04	0.00	-17.20
7,675.00	0.16	276.12	7,670.57	-1.90	-2.05	-1.88	0.25	0.08	90.52
7,700.00	0.15	282.92	7,695.57	-1.89	-2.12	-1.87	0.08	-0.04	27.20
7,725.00	0.14	279.56	7,720.57	-1.88	-2.18	-1.86	0.05	-0.04	-13.44
7,750.00	0.16	270.96	7,745.57	-1.87	-2.24	-1.85	0.12	0.08	-34.40
7,775.00	0.15	284.05	7,770.57	-1.86	-2.31	-1.84	0.15	-0.04	52.36
7,800.00	0.16	281.35	7,795.57	-1.85	-2.38	-1.83	0.05	0.04	-10.80
7,825.00	0.18	254.30	7,820.57	-1.85	-2.45	-1.83	0.33	0.08	-108.20
7,850.00	0.14	249.14	7,845.57	-1.87	-2.52	-1.85	0.17	-0.16	-20.64
7,875.00	0.19	210.43	7,870.57	-1.92	-2.57	-1.90	0.48	0.20	-154.84

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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)
7,900.00	0.18	222.86	7,895.57	-1.99	-2.61	-1.96	0.17	-0.04	49.72
7,925.00	0.21	211.50	7,920.57	-2.05	-2.66	-2.03	0.20	0.12	-45.44
7,950.00	0.21	194.76	7,945.57	-2.14	-2.70	-2.11	0.24	0.00	-66.96
7,975.00	0.25	207.68	7,970.57	-2.23	-2.74	-2.21	0.26	0.16	51.68
8,000.00	0.26	205.70	7,995.57	-2.33	-2.79	-2.31	0.05	0.04	-7.92
8,025.00	0.22	207.77	8,020.57	-2.42	-2.83	-2.40	0.16	-0.16	8.28
8,050.00	0.27	208.24	8,045.57	-2.52	-2.88	-2.49	0.20	0.20	1.88
8,075.00	0.29	207.99	8,070.57	-2.62	-2.94	-2.60	0.08	0.08	-1.00
8,100.00	0.24	188.21	8,095.57	-2.73	-2.98	-2.71	0.41	-0.20	-79.12
8,125.00	0.29	194.13	8,120.57	-2.85	-3.00	-2.82	0.23	0.20	23.68
8,150.00	0.30	204.24	8,145.57	-2.97	-3.04	-2.94	0.21	0.04	40.44
8,175.00	0.30	210.11	8,170.57	-3.08	-3.10	-3.06	0.12	0.00	23.48
8,200.00	0.34	196.66	8,195.57	-3.21	-3.16	-3.18	0.34	0.16	-53.80
8,225.00	0.30	206.35	8,220.57	-3.34	-3.21	-3.31	0.27	-0.16	38.76
8,250.00	0.35	204.00	8,245.56	-3.47	-3.27	-3.44	0.21	0.20	-9.40
8,275.00	0.36	202.12	8,270.56	-3.61	-3.33	-3.58	0.06	0.04	-7.52
8,300.00	0.35	203.41	8,295.56	-3.75	-3.39	-3.73	0.05	-0.04	5.16
8,325.00	0.38	208.06	8,320.56	-3.90	-3.46	-3.87	0.17	0.12	18.60
8,350.00	0.40	205.29	8,345.56	-4.05	-3.53	-4.02	0.11	0.08	-11.08
8,375.00	0.41	202.00	8,370.56	-4.21	-3.60	-4.18	0.10	0.04	-13.16
8,400.00	0.46	204.47	8,395.56	-4.39	-3.68	-4.35	0.21	0.20	9.88
8,425.00	0.52	199.40	8,420.56	-4.58	-3.76	-4.55	0.30	0.24	-20.28
8,450.00	0.50	198.25	8,445.56	-4.79	-3.83	-4.76	0.09	-0.08	-4.60
8,475.00	0.55	193.07	8,470.56	-5.01	-3.89	-4.98	0.28	0.20	-20.72
8,500.00	0.60	195.95	8,495.56	-5.26	-3.96	-5.22	0.23	0.20	11.52
8,525.00	0.61	191.16	8,520.56	-5.51	-4.02	-5.48	0.21	0.04	-19.16
8,550.00	0.64	188.87	8,545.55	-5.78	-4.06	-5.75	0.16	0.12	-9.16
8,575.00	0.67	193.30	8,570.55	-6.06	-4.12	-6.03	0.24	0.12	17.72
8,600.00	0.71	191.29	8,595.55	-6.36	-4.18	-6.32	0.19	0.16	-8.04
8,625.00	0.79	193.89	8,620.55	-6.68	-4.25	-6.64	0.35	0.32	10.40
8,650.00	0.84	196.02	8,645.55	-7.02	-4.35	-6.98	0.23	0.20	8.52
8,675.00	0.80	196.89	8,670.54	-7.36	-4.45	-7.33	0.17	-0.16	3.48
8,700.00	0.82	192.66	8,695.54	-7.70	-4.54	-7.67	0.25	0.08	-16.92
8,725.00	0.76	198.32	8,720.54	-8.04	-4.63	-8.00	0.39	-0.24	22.64
8,750.00	0.82	197.20	8,745.54	-8.36	-4.73	-8.32	0.25	0.24	-4.48
8,775.00	0.83	197.03	8,770.53	-8.71	-4.84	-8.67	0.04	0.04	-0.68
8,800.00	0.80	196.45	8,795.53	-9.05	-4.94	-9.01	0.12	-0.12	-2.32
8,825.00	0.76	188.43	8,820.53	-9.38	-5.02	-9.34	0.46	-0.16	-32.08
8,850.00	0.67	179.54	8,845.53	-9.69	-5.04	-9.65	0.57	-0.36	-35.56
8,875.00	0.58	166.04	8,870.53	-9.96	-5.01	-9.92	0.69	-0.36	-54.00
8,900.00	0.64	160.09	8,895.52	-10.21	-4.93	-10.17	0.35	0.24	-23.80
8,925.00	0.65	155.57	8,920.52	-10.47	-4.82	-10.43	0.21	0.04	-18.08
8,950.00	0.59	150.38	8,945.52	-10.71	-4.70	-10.68	0.33	-0.24	-20.76

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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	0.55	138.32	8,970.52	-10.92	-4.56	-10.88	0.50	-0.16	-48.24
9,000.00	0.37	131.05	8,995.52	-11.06	-4.42	-11.02	0.76	-0.72	-29.08
9,025.00	0.42	126.10	9,020.52	-11.17	-4.28	-11.13	0.24	0.20	-19.80
9,050.00	0.31	107.47	9,045.52	-11.24	-4.14	-11.21	0.64	-0.44	-74.52
9,075.00	0.29	112.98	9,070.52	-11.29	-4.02	-11.25	0.14	-0.08	22.04
9,100.00	0.37	99.41	9,095.52	-11.32	-3.88	-11.29	0.45	0.32	-54.28
9,125.00	0.30	97.99	9,120.52	-11.35	-3.74	-11.31	0.28	-0.28	-5.68
9,150.00	0.37	90.80	9,145.52	-11.36	-3.59	-11.33	0.33	0.28	-28.76
9,175.00	0.44	65.71	9,170.52	-11.32	-3.43	-11.29	0.75	0.28	-100.36
9,200.00	0.59	49.45	9,195.51	-11.19	-3.24	-11.17	0.83	0.60	-65.04
9,225.00	0.71	38.64	9,220.51	-10.99	-3.05	-10.96	0.68	0.48	-43.24
9,250.00	0.75	25.06	9,245.51	-10.72	-2.88	-10.70	0.71	0.16	-54.32
9,275.00	0.82	17.11	9,270.51	-10.40	-2.76	-10.38	0.52	0.28	-31.80
9,300.00	0.94	15.63	9,295.51	-10.03	-2.65	-10.01	0.49	0.48	-5.92
9,325.00	0.87	14.61	9,320.50	-9.65	-2.55	-9.63	0.29	-0.28	-4.08
9,350.00	1.01	18.17	9,345.50	-9.26	-2.43	-9.24	0.61	0.56	14.24
9,375.00	0.99	21.66	9,370.50	-8.85	-2.28	-8.83	0.26	-0.08	13.96
9,400.00	1.15	28.82	9,395.49	-8.43	-2.08	-8.41	0.83	0.64	28.64
9,425.00	1.20	32.46	9,420.49	-7.99	-1.82	-7.97	0.36	0.20	14.56
9,450.00	1.25	31.34	9,445.48	-7.53	-1.54	-7.52	0.22	0.20	-4.48
9,475.00	1.44	31.00	9,470.47	-7.03	-1.23	-7.02	0.76	0.76	-1.36
9,500.00	1.49	25.88	9,495.47	-6.47	-0.93	-6.46	0.56	0.20	-20.48
9,525.00	2.20	17.98	9,520.45	-5.72	-0.64	-5.72	3.01	2.84	-31.60
9,550.00	2.50	14.52	9,545.43	-4.74	-0.35	-4.73	1.33	1.20	-13.84
9,575.00	2.67	11.73	9,570.41	-3.64	-0.10	-3.64	0.85	0.68	-11.16
9,600.00	2.65	12.42	9,595.38	-2.50	0.14	-2.50	0.15	-0.08	2.76
9,625.00	2.69	3.24	9,620.35	-1.35	0.30	-1.36	1.72	0.16	-36.72
9,650.00	2.79	348.34	9,645.32	-0.17	0.21	-0.17	2.87	0.40	-59.60
9,675.00	2.75	344.72	9,670.29	1.00	-0.07	1.00	0.72	-0.16	-14.48
9,700.00	2.83	343.06	9,695.26	2.17	-0.41	2.17	0.45	0.32	-6.64
9,725.00	2.64	341.47	9,720.24	3.31	-0.77	3.31	0.82	-0.76	-6.36
9,750.00	2.49	341.48	9,745.21	4.37	-1.13	4.38	0.60	-0.60	0.04
9,775.00	2.42	342.50	9,770.19	5.39	-1.46	5.40	0.33	-0.28	4.08
9,800.00	2.39	342.40	9,795.17	6.39	-1.77	6.40	0.12	-0.12	-0.40
9,825.00	2.24	342.44	9,820.15	7.35	-2.08	7.37	0.60	-0.60	0.16
9,850.00	2.15	343.48	9,845.13	8.27	-2.36	8.28	0.39	-0.36	4.16
9,875.00	2.20	344.02	9,870.11	9.18	-2.63	9.20	0.22	0.20	2.16
9,900.00	2.30	346.05	9,895.09	10.12	-2.88	10.15	0.51	0.40	8.12
9,925.00	2.37	346.52	9,920.07	11.11	-3.12	11.14	0.29	0.28	1.88
9,950.00	2.48	348.83	9,945.05	12.15	-3.35	12.17	0.59	0.44	9.24
9,975.00	2.41	347.83	9,970.02	13.19	-3.56	13.22	0.33	-0.28	-4.00
10,000.00	2.50	347.67	9,995.00	14.24	-3.79	14.27	0.36	0.36	-0.64
10,025.00	2.50	348.35	10,019.98	15.30	-4.01	15.34	0.12	0.00	2.72
10,050.00	2.49	349.85	10,044.95	16.37	-4.22	16.41	0.26	-0.04	6.00

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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	2.50	347.55	10,069.93	17.44	-4.43	17.48	0.40	0.04	-9.20
10,100.00	2.38	349.78	10,094.91	18.48	-4.64	18.52	0.61	-0.48	8.92
10,125.00	1.98	351.18	10,119.89	19.42	-4.80	19.46	1.61	-1.60	5.60
10,150.00	1.64	1.36	10,144.88	20.21	-4.86	20.25	1.87	-1.36	40.72
10,175.00	1.52	0.64	10,169.87	20.89	-4.85	20.93	0.49	-0.48	-2.88
10,200.00	1.19	3.36	10,194.86	21.49	-4.83	21.52	1.34	-1.32	10.88
10,225.00	1.00	11.39	10,219.86	21.96	-4.77	22.00	0.98	-0.76	32.12
10,250.00	0.79	10.68	10,244.85	22.34	-4.69	22.38	0.84	-0.84	-2.84
10,275.00	0.67	6.34	10,269.85	22.66	-4.65	22.69	0.53	-0.48	-17.36
10,300.00	0.50	15.09	10,294.85	22.91	-4.60	22.94	0.77	-0.68	35.00
10,325.00	0.49	9.79	10,319.85	23.12	-4.56	23.15	0.19	-0.04	-21.20
10,350.00	0.43	358.34	10,344.85	23.32	-4.54	23.35	0.44	-0.24	-45.80
10,375.00	0.49	348.03	10,369.85	23.51	-4.56	23.55	0.41	0.24	-41.24
10,400.00	0.58	333.16	10,394.85	23.73	-4.64	23.77	0.66	0.36	-59.48
10,425.00	0.64	341.87	10,419.84	23.98	-4.74	24.02	0.44	0.24	34.84
10,450.00	0.70	336.86	10,444.84	24.25	-4.85	24.29	0.34	0.24	-20.04
10,475.00	0.63	342.15	10,469.84	24.52	-4.95	24.56	0.37	-0.28	21.16
10,500.00	0.76	354.55	10,494.84	24.82	-5.01	24.86	0.79	0.52	49.60
10,525.00	0.81	357.06	10,519.84	25.16	-5.03	25.20	0.24	0.20	10.04
10,550.00	0.70	356.62	10,544.83	25.49	-5.05	25.53	0.44	-0.44	-1.76
10,575.00	0.67	355.86	10,569.83	25.79	-5.07	25.83	0.13	-0.12	-3.04
10,600.00	0.79	6.45	10,594.83	26.10	-5.06	26.15	0.72	0.48	42.36
10,625.00	0.83	6.61	10,619.83	26.46	-5.02	26.50	0.16	0.16	0.64
10,650.00	0.71	4.56	10,644.83	26.79	-4.99	26.83	0.49	-0.48	-8.20
10,675.00	0.78	5.59	10,669.82	27.11	-4.96	27.15	0.29	0.28	4.12
10,700.00	0.83	5.30	10,694.82	27.46	-4.93	27.50	0.20	0.20	-1.16
10,725.00	0.97	8.63	10,719.82	27.85	-4.88	27.89	0.60	0.56	13.32
10,750.00	0.79	9.63	10,744.82	28.23	-4.82	28.27	0.72	-0.72	4.00
10,775.00	0.91	11.30	10,769.81	28.60	-4.75	28.63	0.49	0.48	6.68
10,800.00	0.95	5.34	10,794.81	29.00	-4.69	29.04	0.42	0.16	-23.84
10,825.00	0.91	9.08	10,819.81	29.40	-4.64	29.44	0.29	-0.16	14.96
10,850.00	0.92	9.90	10,844.80	29.79	-4.57	29.83	0.07	0.04	3.28
10,875.00	0.84	11.91	10,869.80	30.17	-4.50	30.21	0.34	-0.32	8.04
10,900.00	0.78	10.47	10,894.80	30.52	-4.43	30.55	0.25	-0.24	-5.76
10,925.00	0.86	8.24	10,919.79	30.87	-4.38	30.91	0.34	0.32	-8.92
10,950.00	1.00	3.69	10,944.79	31.27	-4.34	31.31	0.63	0.56	-18.20
10,975.00	1.02	9.35	10,969.79	31.71	-4.28	31.75	0.41	0.08	22.64
10,994.00	1.07	3.69	10,988.78	32.05	-4.25	32.09	0.60	0.26	-29.79
Tie In									
11,169.00	1.46	356.78	11,163.74	35.91	-4.27	35.95	0.24	0.22	-3.95
First Phoenix MWD Survey									
11,201.00	3.60	346.27	11,195.71	37.29	-4.53	37.33	6.81	6.69	-32.84
11,232.00	5.02	349.73	11,226.62	39.57	-5.00	39.61	4.65	4.58	11.16



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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)
11,264.00	9.72	352.22	11,258.35	43.63	-5.62	43.68	14.72	14.69	7.78
11,295.00	12.69	352.25	11,288.75	49.60	-6.43	49.65	9.58	9.58	0.10
11,326.00	13.11	351.62	11,318.97	56.45	-7.40	56.51	1.43	1.35	-2.03
11,358.00	16.30	350.52	11,349.92	64.47	-8.67	64.54	10.01	9.97	-3.44
11,389.00	19.54	354.33	11,379.41	73.93	-9.90	74.00	11.11	10.45	12.29
11,421.00	22.91	355.91	11,409.24	85.47	-10.87	85.55	10.68	10.53	4.94
11,452.00	27.19	358.11	11,437.31	98.57	-11.54	98.66	14.13	13.81	7.10
11,483.00	31.29	358.37	11,464.36	113.70	-12.00	113.80	13.23	13.23	0.84
11,515.00	35.45	359.26	11,491.08	131.30	-12.36	131.39	13.09	13.00	2.78
11,546.00	39.94	359.31	11,515.60	150.24	-12.59	150.34	14.48	14.48	0.16
11,578.00	44.13	358.87	11,539.36	171.66	-12.94	171.77	13.13	13.09	-1.38
11,609.00	48.24	0.15	11,560.82	194.03	-13.12	194.13	13.59	13.26	4.13
11,641.00	50.12	359.83	11,581.74	218.24	-13.12	218.34	5.92	5.88	-1.00
11,672.00	52.93	1.30	11,601.02	242.51	-12.88	242.60	9.79	9.06	4.74
11,704.00	55.36	1.79	11,619.77	268.43	-12.18	268.52	7.69	7.59	1.53
11,735.00	59.14	1.66	11,636.53	294.49	-11.39	294.57	12.20	12.19	-0.42
11,767.00	60.48	1.57	11,652.63	322.13	-10.61	322.21	4.19	4.19	-0.28
11,798.00	62.55	359.55	11,667.41	349.38	-10.35	349.45	8.80	6.68	-6.52
11,830.00	65.86	357.25	11,681.34	378.17	-11.16	378.25	12.20	10.34	-7.19
11,861.00	69.09	357.01	11,693.21	406.77	-12.60	406.86	10.44	10.42	-0.77
11,892.00	69.35	356.39	11,704.21	435.70	-14.27	435.80	2.05	0.84	-2.00
11,924.00	73.22	356.72	11,714.47	465.95	-16.09	466.07	12.13	12.09	1.03
11,955.00	76.74	355.70	11,722.51	495.82	-18.07	495.95	11.79	11.35	-3.29
11,959.00	77.33	355.77	11,723.40	499.71	-18.36	499.84	14.91	14.81	1.78
FTP: 11959' MD									
11,987.00	81.48	356.26	11,728.55	527.16	-20.27	527.31	14.91	14.81	1.75
12,018.00	85.26	356.27	11,732.13	557.88	-22.27	558.04	12.19	12.19	0.03
12,050.00	86.29	356.62	11,734.49	589.73	-24.25	589.91	3.40	3.22	1.09
12,081.00	87.15	357.64	11,736.26	620.64	-25.80	620.83	4.30	2.77	3.29
12,112.00	92.22	358.37	11,736.43	651.61	-26.88	651.81	16.52	16.35	2.35
12,144.00	95.10	359.84	11,734.39	683.54	-27.38	683.74	10.10	9.00	4.59
12,239.00	95.51	1.10	11,725.60	778.12	-26.61	778.32	1.39	0.43	1.33
12,333.00	93.75	1.09	11,718.02	871.80	-24.81	871.97	1.87	-1.87	-0.01
12,427.00	90.15	1.76	11,714.82	965.70	-22.48	965.85	3.90	-3.83	0.71
12,522.00	90.64	2.35	11,714.16	1,060.63	-19.07	1,060.75	0.81	0.52	0.62
12,616.00	91.04	3.17	11,712.78	1,154.51	-14.55	1,154.59	0.97	0.43	0.87
12,710.00	90.41	2.58	11,711.60	1,248.38	-9.83	1,248.42	0.92	-0.67	-0.63
12,804.00	90.04	0.85	11,711.23	1,342.34	-7.02	1,342.35	1.88	-0.39	-1.84
12,898.00	90.07	0.38	11,711.14	1,436.33	-6.01	1,436.33	0.50	0.03	-0.50
12,993.00	90.53	358.98	11,710.64	1,531.33	-6.54	1,531.33	1.55	0.48	-1.47
13,087.00	91.70	358.82	11,708.81	1,625.29	-8.34	1,625.30	1.26	1.24	-0.17
13,181.00	90.78	358.99	11,706.78	1,719.25	-10.14	1,719.28	1.00	-0.98	0.18
13,275.00	91.32	359.10	11,705.05	1,813.22	-11.71	1,813.26	0.59	0.57	0.12
13,370.00	91.38	357.48	11,702.81	1,908.15	-14.54	1,908.20	1.71	0.06	-1.71

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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)
13,464.00	92.06	357.40	11,699.99	2,002.01	-18.74	2,002.10	0.73	0.72	-0.09
13,558.00	92.90	357.81	11,695.93	2,095.84	-22.66	2,095.96	0.99	0.89	0.44
13,653.00	93.18	358.13	11,690.89	2,190.65	-26.02	2,190.79	0.45	0.29	0.34
13,746.00	92.07	359.54	11,686.63	2,283.53	-27.91	2,283.68	1.93	-1.19	1.52
13,841.00	92.20	0.12	11,683.09	2,378.46	-28.19	2,378.61	0.63	0.14	0.61
13,935.00	92.80	0.67	11,678.99	2,472.37	-27.55	2,472.51	0.87	0.64	0.59
14,029.00	92.04	0.74	11,675.02	2,566.28	-26.39	2,566.41	0.81	-0.81	0.07
14,124.00	92.40	1.51	11,671.34	2,661.19	-24.53	2,661.30	0.89	0.38	0.81
14,218.00	93.23	0.31	11,666.72	2,755.06	-23.03	2,755.15	1.55	0.88	-1.28
14,312.00	93.55	359.06	11,661.16	2,848.89	-23.55	2,848.99	1.37	0.34	-1.33
14,406.00	94.26	359.50	11,654.76	2,942.66	-24.73	2,942.77	0.89	0.76	0.47
14,501.00	93.74	359.15	11,648.14	3,037.43	-25.85	3,037.54	0.66	-0.55	-0.37
14,595.00	94.40	359.52	11,641.46	3,131.18	-26.93	3,131.30	0.80	0.70	0.39
14,690.00	93.94	359.50	11,634.56	3,225.93	-27.74	3,226.05	0.48	-0.48	-0.02
14,784.00	91.90	0.07	11,629.77	3,319.80	-28.10	3,319.92	2.25	-2.17	0.61
14,878.00	92.06	0.62	11,626.52	3,413.74	-27.53	3,413.85	0.61	0.17	0.59
14,972.00	91.07	0.33	11,623.95	3,507.70	-26.75	3,507.80	1.10	-1.05	-0.31
15,066.00	91.44	0.56	11,621.89	3,601.67	-26.02	3,601.77	0.46	0.39	0.24
15,160.00	92.30	1.32	11,618.83	3,695.61	-24.48	3,695.69	1.22	0.91	0.81
15,254.00	91.49	0.68	11,615.72	3,789.54	-22.84	3,789.60	1.10	-0.86	-0.68
15,349.00	90.12	359.13	11,614.38	3,884.53	-23.00	3,884.59	2.18	-1.44	-1.63
15,443.00	90.59	359.42	11,613.80	3,978.52	-24.19	3,978.58	0.59	0.50	0.31
15,537.00	91.76	0.37	11,611.87	4,072.50	-24.36	4,072.56	1.60	1.24	1.01
15,632.00	91.81	359.90	11,608.91	4,167.45	-24.14	4,167.51	0.50	0.05	-0.49
15,726.00	90.44	358.79	11,607.07	4,261.42	-25.21	4,261.48	1.88	-1.46	-1.18
15,789.00	90.64	358.65	11,606.48	4,324.40	-26.62	4,324.48	0.39	0.32	-0.22
15,883.00	91.18	358.27	11,604.98	4,418.36	-29.14	4,418.45	0.70	0.57	-0.40
15,977.00	91.21	357.83	11,603.02	4,512.28	-32.34	4,512.39	0.47	0.03	-0.47
16,071.00	91.19	357.33	11,601.05	4,606.18	-36.31	4,606.32	0.53	-0.02	-0.53
16,166.00	91.64	356.85	11,598.71	4,701.03	-41.13	4,701.20	0.69	0.47	-0.51
16,260.00	92.27	358.22	11,595.50	4,794.88	-45.17	4,795.09	1.60	0.67	1.46
16,355.00	92.26	0.34	11,591.75	4,889.79	-46.36	4,890.01	2.23	-0.01	2.23
16,449.00	91.95	1.78	11,588.29	4,983.71	-44.63	4,983.91	1.57	-0.33	1.53
16,544.00	91.19	2.19	11,585.69	5,078.62	-41.34	5,078.79	0.91	-0.80	0.43
16,638.00	91.18	1.57	11,583.75	5,172.55	-38.25	5,172.69	0.66	-0.01	-0.66
16,732.00	91.29	358.99	11,581.72	5,266.52	-37.80	5,266.65	2.75	0.12	-2.74
16,827.00	91.26	356.40	11,579.61	5,361.41	-41.61	5,361.57	2.73	-0.03	-2.73
16,921.00	91.21	355.17	11,577.58	5,455.13	-48.52	5,455.34	1.31	-0.05	-1.31
17,015.00	91.22	355.94	11,575.59	5,548.83	-55.81	5,549.10	0.82	0.01	0.82
17,110.00	90.19	355.48	11,574.42	5,643.55	-62.91	5,643.88	1.19	-1.08	-0.48
17,204.00	89.48	355.92	11,574.69	5,737.28	-69.96	5,737.67	0.89	-0.76	0.47
17,298.00	89.76	358.19	11,575.31	5,831.15	-74.79	5,831.57	2.43	0.30	2.41
17,392.00	90.08	0.91	11,575.44	5,925.14	-75.53	5,925.56	2.91	0.34	2.89

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Com	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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)
17,487.00	90.44	3.28	11,575.01	6,020.07	-72.05	6,020.46	2.52	0.38	2.49
17,581.00	91.07	5.25	11,573.77	6,113.80	-65.06	6,114.12	2.20	0.67	2.10
17,675.00	91.29	5.89	11,571.84	6,207.33	-55.94	6,207.58	0.72	0.23	0.68
17,769.00	91.29	6.98	11,569.72	6,300.71	-45.41	6,300.87	1.16	0.00	1.16
17,863.00	91.29	8.65	11,567.60	6,393.81	-32.63	6,393.86	1.78	0.00	1.78
17,958.00	91.21	10.00	11,565.53	6,487.53	-17.24	6,487.45	1.42	-0.08	1.42
18,052.00	91.15	9.15	11,563.60	6,580.20	-1.61	6,579.99	0.91	-0.06	-0.90
18,146.00	91.21	8.26	11,561.66	6,673.10	12.61	6,672.76	0.95	0.06	-0.95
18,240.00	91.27	8.03	11,559.63	6,766.13	25.93	6,765.68	0.25	0.06	-0.24
18,335.00	91.29	7.79	11,557.50	6,860.20	39.00	6,859.64	0.25	0.02	-0.25
18,429.00	91.27	7.60	11,555.40	6,953.33	51.58	6,952.66	0.20	-0.02	-0.20
18,524.00	91.24	7.06	11,553.32	7,047.53	63.70	7,046.76	0.57	-0.03	-0.57
18,618.00	91.24	6.60	11,551.29	7,140.84	74.88	7,139.97	0.49	0.00	-0.49
18,713.00	90.98	5.99	11,549.45	7,235.25	85.29	7,234.29	0.70	-0.27	-0.64
18,807.00	90.10	5.40	11,548.56	7,328.78	94.62	7,327.74	1.13	-0.94	-0.63
18,901.00	89.21	5.03	11,549.13	7,422.39	103.16	7,421.28	1.03	-0.95	-0.39
18,996.00	88.50	4.73	11,551.03	7,517.03	111.24	7,515.84	0.81	-0.75	-0.32
19,090.00	87.56	4.19	11,554.26	7,610.69	118.55	7,609.44	1.15	-1.00	-0.57
19,180.00	86.51	3.43	11,558.91	7,700.37	124.52	7,699.06	1.44	-1.17	-0.84
19,276.00	89.88	1.24	11,561.94	7,796.22	128.43	7,794.88	4.19	3.51	-2.28
19,370.00	91.24	358.23	11,561.02	7,890.20	127.99	7,888.86	3.51	1.45	-3.20
19,464.00	91.15	354.79	11,559.06	7,983.99	122.27	7,982.70	3.66	-0.10	-3.66
19,559.00	91.22	352.98	11,557.09	8,078.43	112.15	8,077.21	1.91	0.07	-1.91
19,653.00	91.75	353.22	11,554.66	8,171.71	100.86	8,170.59	0.62	0.56	0.26
19,747.00	92.24	354.50	11,551.38	8,265.12	90.82	8,264.07	1.46	0.52	1.36
19,841.00	92.26	356.50	11,547.69	8,358.75	83.45	8,357.77	2.13	0.02	2.13
19,934.00	92.37	357.60	11,543.94	8,451.55	78.67	8,450.60	1.19	0.12	1.18
20,028.00	92.47	357.54	11,539.97	8,545.38	74.68	8,544.46	0.12	0.11	-0.06
20,122.00	92.83	357.14	11,535.62	8,639.18	70.33	8,638.29	0.57	0.38	-0.43
20,216.00	93.00	356.48	11,530.84	8,732.91	65.10	8,732.07	0.72	0.18	-0.70
20,311.00	93.48	355.86	11,525.47	8,827.55	58.77	8,826.75	0.82	0.51	-0.65
20,405.00	94.23	355.38	11,519.15	8,921.06	51.60	8,920.32	0.95	0.80	-0.51
20,500.00	94.09	354.06	11,512.26	9,015.40	42.88	9,014.74	1.39	-0.15	-1.39
20,595.00	91.07	351.24	11,507.98	9,109.51	30.74	9,108.94	4.35	-3.18	-2.97
20,689.00	89.28	350.39	11,507.70	9,202.30	15.74	9,201.85	2.11	-1.90	-0.90
20,783.00	89.81	349.97	11,508.44	9,294.92	-0.29	9,294.60	0.72	0.56	-0.45
20,878.00	90.24	350.77	11,508.40	9,388.58	-16.18	9,388.39	0.96	0.45	0.84
20,972.00	90.50	353.27	11,507.79	9,481.66	-29.23	9,481.57	2.67	0.28	2.66
21,066.00	90.22	355.03	11,507.20	9,575.16	-38.81	9,575.15	1.90	-0.30	1.87
21,160.00	90.21	358.35	11,506.85	9,668.99	-44.24	9,669.02	3.53	-0.01	3.53
21,254.00	89.53	356.62	11,507.06	9,762.90	-48.36	9,762.96	1.98	-0.72	-1.84
21,349.00	89.38	355.44	11,507.97	9,857.66	-54.94	9,857.78	1.25	-0.16	-1.24
21,443.00	89.25	358.33	11,509.09	9,951.51	-60.05	9,951.66	3.08	-0.14	3.07



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3771.00usft (Scan Quest)
Site:	Boone 16 State Corn	MD Reference:	RKB @ 3771.00usft (Scan Quest)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 64760	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scan Drill Quest)	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)
21,537.00	89.44	1.18	11,510.17	10,045.49	-60.45	10,045.65	3.04	0.20	3.03
21,631.00	90.29	0.97	11,510.39	10,139.47	-58.69	10,139.61	0.93	0.90	-0.22
21,726.00	90.32	0.43	11,509.88	10,234.46	-57.53	10,234.59	0.57	0.03	-0.57
21,820.00	90.24	359.36	11,509.42	10,328.46	-57.70	10,328.58	1.14	-0.09	-1.14
21,914.00	90.21	357.66	11,509.05	10,422.43	-60.14	10,422.56	1.81	-0.03	-1.81
22,008.00	90.32	357.06	11,508.62	10,516.32	-64.47	10,516.50	0.65	0.12	-0.64
22,103.00	90.33	356.67	11,508.08	10,611.18	-69.67	10,611.39	0.41	0.01	-0.41
22,197.00	90.24	356.22	11,507.61	10,705.00	-75.49	10,705.26	0.49	-0.10	-0.48
22,291.00	90.22	355.50	11,507.24	10,798.75	-82.28	10,799.06	0.77	-0.02	-0.77
22,319.00	90.32	355.38	11,507.10	10,826.66	-84.51	10,826.99	0.56	0.36	-0.43
Final Phoenix MWD Survey									
22,350.00	90.32	355.38	11,506.93	10,857.56	-87.00	10,857.91	0.00	0.00	0.00
LTP: 22350' MD									
22,400.00	90.32	355.38	11,506.65	10,907.40	-91.03	10,907.78	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)	
10,994.00	10,988.78	32.05	-4.25	Tie In
11,169.00	11,163.74	35.91	-4.27	First Phoenix MWD Survey
11,959.00	11,723.40	499.71	-18.36	FTP: 11959' MD
22,319.00	11,507.10	10,826.66	-84.51	Final Phoenix MWD Survey
22,350.00	11,506.93	10,857.56	-87.00	LTP: 22350' MD
22,400.00	11,506.65	10,907.40	-91.03	Projection to TD