



PHOENIX
TECHNOLOGY SERVICES

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JAN 15 2020

RECEIVED

COG Operating LLC

**Lea County, NM (NAD27 NME)
Fez Federal Com
701H**

OH / 64018

Design: Surveys (McVay 8)

Standard Survey Report

26 March, 2019





Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 701H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3269.60usft (McVay 8)
Site:	Fez Federal Com	MD Reference:	RKB @ 3269.60usft (McVay 8)
Well:	701H	North Reference:	Grid
Wellbore:	OH / 64018	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

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

Site	Fez Federal Com				
Site Position:		Northing:	415,342.20 usft	Latitude:	32° 8' 17.8100 N
From:	Map	Easting:	795,972.50 usft	Longitude:	103° 22' 37.7348 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.51 °

Well	701H				
Well Position	+N/-S	0.00 usft	Northing:	415,348.00 usft	Latitude: 32° 8' 17.8089 N
	+E/-W	0.00 usft	Easting:	796,637.50 usft	Longitude: 103° 22' 30.0010 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level: 3,243.60 usft

Wellbore	OH / 64018				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	1/31/2019	6.65	59.79	47,801.45851650

Design	Surveys (McVay 8)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	1.98	

Survey Program	Date 3/26/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	11,750.00	Scientific Gyro Surveys (OH / 64018)	Scientific Keeper	Scientific Drilling Intl. Standard Wireline Keeper
11,648.00	22,481.00	Phoenix MWD Surveys (OH / 64018)	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	0.57	260.76	100.00	-0.08	-0.49	-0.10	0.57	0.57	0.00
	125.00	0.73	265.26	125.00	-0.11	-0.77	-0.14	0.67	0.64	18.00
	150.00	0.72	266.17	149.99	-0.14	-1.09	-0.17	0.06	-0.04	3.64
	175.00	0.49	273.05	174.99	-0.14	-1.35	-0.19	0.96	-0.92	27.52
	200.00	0.56	269.40	199.99	-0.14	-1.58	-0.19	0.31	0.28	-14.60
	225.00	0.60	265.77	224.99	-0.15	-1.83	-0.21	0.22	0.16	-14.52
	250.00	0.78	260.58	249.99	-0.19	-2.13	-0.26	0.76	0.72	-20.76
	275.00	0.60	272.46	274.99	-0.21	-2.43	-0.29	0.92	-0.72	47.52
	300.00	0.58	258.55	299.99	-0.23	-2.68	-0.32	0.58	-0.08	-55.64

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Wellbore:	OH / 64018	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	0.39	251.86	324.99	-0.28	-2.89	-0.38	0.79	-0.76	-26.76
350.00	0.30	228.87	349.98	-0.35	-3.02	-0.45	0.65	-0.36	-91.96
375.00	0.36	240.10	374.98	-0.43	-3.14	-0.54	0.35	0.24	44.92
400.00	0.29	231.15	399.98	-0.51	-3.25	-0.62	0.35	-0.28	-35.80
425.00	0.26	240.05	424.98	-0.58	-3.35	-0.69	0.21	-0.12	35.60
450.00	0.32	232.79	449.98	-0.65	-3.46	-0.77	0.28	0.24	-29.04
475.00	0.24	243.14	474.98	-0.71	-3.56	-0.84	0.38	-0.32	41.40
500.00	0.32	235.32	499.98	-0.78	-3.66	-0.90	0.35	0.32	-31.28
525.00	0.30	233.92	524.98	-0.86	-3.77	-0.99	0.09	-0.08	-5.60
550.00	0.32	232.18	549.98	-0.94	-3.88	-1.07	0.09	0.08	-6.96
575.00	0.17	241.65	574.98	-1.00	-3.97	-1.13	0.62	-0.60	37.88
600.00	0.34	241.29	599.98	-1.05	-4.07	-1.19	0.68	0.68	-1.44
625.00	0.26	243.53	624.98	-1.11	-4.18	-1.26	0.32	-0.32	8.96
650.00	0.29	246.35	649.98	-1.16	-4.29	-1.31	0.13	0.12	11.28
675.00	0.29	243.55	674.98	-1.22	-4.41	-1.37	0.06	0.00	-11.20
700.00	0.26	247.23	699.98	-1.27	-4.52	-1.42	0.14	-0.12	14.72
725.00	0.30	252.35	724.98	-1.31	-4.63	-1.47	0.19	0.16	20.48
750.00	0.33	247.65	749.98	-1.35	-4.76	-1.52	0.16	0.12	-18.80
775.00	0.31	264.47	774.98	-1.39	-4.89	-1.56	0.38	-0.08	67.28
800.00	0.36	265.74	799.98	-1.40	-5.04	-1.57	0.20	0.20	5.08
825.00	0.28	263.65	824.98	-1.41	-5.18	-1.59	0.32	-0.32	-8.36
850.00	0.40	261.00	849.98	-1.43	-5.33	-1.62	0.48	0.48	-10.60
875.00	0.33	265.82	874.98	-1.45	-5.48	-1.64	0.31	-0.28	19.28
900.00	0.35	267.78	899.98	-1.46	-5.63	-1.65	0.09	0.08	7.84
925.00	0.30	276.11	924.98	-1.46	-5.77	-1.66	0.27	-0.20	33.32
950.00	0.34	274.28	949.98	-1.44	-5.91	-1.65	0.17	0.16	-7.32
975.00	0.29	277.08	974.98	-1.43	-6.05	-1.64	0.21	-0.20	11.20
1,000.00	0.33	271.56	999.98	-1.42	-6.18	-1.63	0.20	0.16	-22.08
1,025.00	0.37	271.89	1,024.97	-1.42	-6.34	-1.63	0.16	0.16	1.32
1,050.00	0.29	272.99	1,049.97	-1.41	-6.48	-1.63	0.32	-0.32	4.40
1,075.00	0.28	271.42	1,074.97	-1.41	-6.60	-1.63	0.05	-0.04	-6.28
1,100.00	0.34	267.61	1,099.97	-1.41	-6.74	-1.64	0.25	0.24	-15.24
1,125.00	0.44	263.08	1,124.97	-1.42	-6.91	-1.66	0.42	0.40	-18.12
1,150.00	0.47	263.03	1,149.97	-1.45	-7.11	-1.69	0.12	0.12	-0.20
1,175.00	0.37	256.77	1,174.97	-1.48	-7.29	-1.73	0.44	-0.40	-25.04
1,200.00	0.26	272.60	1,199.97	-1.49	-7.42	-1.75	0.56	-0.44	63.32
1,225.00	0.19	225.38	1,224.97	-1.52	-7.51	-1.78	0.77	-0.28	-188.88
1,250.00	0.26	135.39	1,249.97	-1.59	-7.50	-1.85	1.29	0.28	-359.96
1,275.00	0.54	138.37	1,274.97	-1.72	-7.38	-1.97	1.12	1.12	11.92
1,300.00	0.69	133.56	1,299.97	-1.91	-7.19	-2.16	0.63	0.60	-19.24
1,325.00	0.69	133.20	1,324.97	-2.12	-6.97	-2.36	0.02	0.00	-1.44
1,350.00	0.69	133.10	1,349.97	-2.32	-6.75	-2.55	0.00	0.00	-0.40
1,375.00	0.67	134.59	1,374.96	-2.53	-6.54	-2.75	0.11	-0.08	5.96

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1,400.00	0.70	134.27	1,399.96	-2.74	-6.33	-2.95	0.12	0.12	-1.28
1,425.00	0.67	131.37	1,424.96	-2.94	-6.11	-3.15	0.18	-0.12	-11.60
1,450.00	0.73	128.71	1,449.96	-3.14	-5.87	-3.34	0.27	0.24	-10.64
1,475.00	0.86	128.21	1,474.96	-3.35	-5.60	-3.54	0.52	0.52	-2.00
1,500.00	0.84	134.13	1,499.95	-3.60	-5.32	-3.78	0.36	-0.08	23.68
1,525.00	0.80	136.27	1,524.95	-3.85	-5.07	-4.02	0.20	-0.16	8.56
1,550.00	0.68	133.79	1,549.95	-4.08	-4.84	-4.24	0.50	-0.48	-9.92
1,575.00	0.59	140.98	1,574.95	-4.28	-4.65	-4.44	0.48	-0.36	28.76
1,600.00	0.58	134.06	1,599.95	-4.47	-4.48	-4.62	0.29	-0.04	-27.68
1,625.00	0.56	133.32	1,624.94	-4.64	-4.30	-4.79	0.09	-0.08	-2.96
1,650.00	0.46	121.55	1,649.94	-4.78	-4.13	-4.92	0.58	-0.40	-47.08
1,675.00	0.49	119.72	1,674.94	-4.88	-3.95	-5.02	0.13	0.12	-7.32
1,700.00	0.53	120.95	1,699.94	-4.99	-3.76	-5.12	0.17	0.16	4.92
1,725.00	0.56	114.50	1,724.94	-5.10	-3.55	-5.22	0.27	0.12	-25.80
1,750.00	0.66	105.40	1,749.94	-5.19	-3.30	-5.30	0.56	0.40	-36.40
1,775.00	0.65	114.04	1,774.94	-5.29	-3.03	-5.39	0.40	-0.04	34.56
1,800.00	0.59	118.69	1,799.94	-5.41	-2.79	-5.50	0.31	-0.24	18.60
1,825.00	0.55	121.90	1,824.93	-5.53	-2.57	-5.62	0.20	-0.16	12.84
1,850.00	0.48	124.87	1,849.93	-5.66	-2.38	-5.74	0.30	-0.28	11.88
1,875.00	0.52	113.83	1,874.93	-5.76	-2.19	-5.84	0.42	0.16	-44.16
1,900.00	0.47	112.65	1,899.93	-5.85	-2.00	-5.91	0.20	-0.20	-4.72
1,925.00	0.53	109.64	1,924.93	-5.93	-1.79	-5.99	0.26	0.24	-12.04
1,950.00	0.53	104.50	1,949.93	-6.00	-1.57	-6.05	0.19	0.00	-20.56
1,975.00	0.51	114.75	1,974.93	-6.07	-1.36	-6.11	0.38	-0.08	41.00
2,000.00	0.63	124.31	1,999.93	-6.19	-1.14	-6.23	0.61	0.48	38.24
2,025.00	0.80	123.54	2,024.93	-6.37	-0.88	-6.40	0.68	0.68	-3.08
2,050.00	0.91	123.27	2,049.92	-6.57	-0.57	-6.59	0.44	0.44	-1.08
2,075.00	0.91	127.10	2,074.92	-6.80	-0.25	-6.81	0.24	0.00	15.32
2,100.00	0.95	128.32	2,099.92	-7.05	0.07	-7.04	0.18	0.16	4.88
2,125.00	0.91	131.20	2,124.91	-7.31	0.38	-7.29	0.25	-0.16	11.52
2,150.00	0.92	133.24	2,149.91	-7.58	0.68	-7.55	0.14	0.04	8.16
2,175.00	0.99	131.67	2,174.91	-7.86	0.99	-7.82	0.30	0.28	-6.28
2,200.00	0.84	127.16	2,199.90	-8.11	1.29	-8.06	0.67	-0.60	-18.04
2,225.00	0.76	131.36	2,224.90	-8.33	1.56	-8.27	0.40	-0.32	16.80
2,250.00	0.72	129.07	2,249.90	-8.54	1.81	-8.47	0.20	-0.16	-9.16
2,275.00	0.59	127.36	2,274.90	-8.72	2.04	-8.64	0.53	-0.52	-6.84
2,300.00	0.58	118.86	2,299.90	-8.86	2.25	-8.78	0.35	-0.04	-34.00
2,325.00	0.63	112.66	2,324.89	-8.97	2.49	-8.88	0.33	0.20	-24.80
2,350.00	0.56	109.62	2,349.89	-9.07	2.73	-8.97	0.31	-0.28	-12.16
2,375.00	0.60	112.77	2,374.89	-9.16	2.96	-9.05	0.20	0.16	12.60
2,400.00	0.55	118.64	2,399.89	-9.27	3.19	-9.15	0.31	-0.20	23.48
2,425.00	0.68	115.53	2,424.89	-9.39	3.43	-9.26	0.54	0.52	-12.44
2,450.00	0.83	119.37	2,449.89	-9.54	3.72	-9.41	0.63	0.60	15.36



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2,475.00	0.91	125.82	2,474.88	-9.75	4.04	-9.60	0.51	0.32	25.80
2,500.00	1.10	131.08	2,499.88	-10.02	4.38	-9.86	0.84	0.76	21.04
2,525.00	1.04	131.71	2,524.88	-10.33	4.73	-10.16	0.24	-0.24	2.52
2,550.00	1.00	134.71	2,549.87	-10.63	5.06	-10.45	0.27	-0.16	12.00
2,575.00	0.95	130.70	2,574.87	-10.92	5.37	-10.73	0.34	-0.20	-16.04
2,600.00	0.96	124.86	2,599.86	-11.18	5.70	-10.97	0.39	0.04	-23.36
2,625.00	0.97	119.02	2,624.86	-11.40	6.05	-11.18	0.40	0.04	-23.36
2,650.00	1.02	117.73	2,649.86	-11.60	6.44	-11.38	0.22	0.20	-5.16
2,675.00	1.05	125.17	2,674.85	-11.84	6.82	-11.60	0.55	0.12	29.76
2,700.00	0.91	129.23	2,699.85	-12.10	7.16	-11.84	0.62	-0.56	16.24
2,725.00	1.05	120.62	2,724.85	-12.34	7.51	-12.07	0.81	0.56	-34.44
2,750.00	1.15	121.92	2,749.84	-12.59	7.92	-12.31	0.41	0.40	5.20
2,775.00	1.15	122.37	2,774.84	-12.86	8.35	-12.56	0.04	0.00	1.80
2,800.00	1.17	124.08	2,799.83	-13.13	8.77	-12.82	0.16	0.08	6.84
2,825.00	1.07	124.38	2,824.83	-13.41	9.17	-13.08	0.40	-0.40	1.20
2,850.00	1.13	120.50	2,849.82	-13.67	9.58	-13.33	0.38	0.24	-15.52
2,875.00	1.09	120.36	2,874.82	-13.91	10.00	-13.56	0.16	-0.16	-0.56
2,900.00	1.09	119.00	2,899.81	-14.15	10.41	-13.78	0.10	0.00	-5.44
2,925.00	1.01	114.98	2,924.81	-14.35	10.82	-13.97	0.43	-0.32	-16.08
2,950.00	0.88	100.89	2,949.81	-14.48	11.21	-14.09	1.06	-0.52	-56.36
2,975.00	0.80	101.74	2,974.80	-14.56	11.57	-14.15	0.32	-0.32	3.40
3,000.00	0.80	96.34	2,999.80	-14.61	11.91	-14.19	0.30	0.00	-21.60
3,025.00	0.76	100.51	3,024.80	-14.66	12.25	-14.23	0.28	-0.16	16.68
3,050.00	0.86	100.55	3,049.80	-14.72	12.59	-14.28	0.40	0.40	0.16
3,075.00	0.78	104.74	3,074.79	-14.80	12.94	-14.35	0.40	-0.32	16.76
3,100.00	0.79	106.58	3,099.79	-14.89	13.27	-14.43	0.11	0.04	7.36
3,125.00	0.71	122.47	3,124.79	-15.03	13.57	-14.55	0.89	-0.32	63.56
3,150.00	0.82	124.87	3,149.79	-15.21	13.85	-14.72	0.46	0.44	9.60
3,175.00	0.74	135.81	3,174.78	-15.43	14.11	-14.93	0.67	-0.32	43.76
3,200.00	0.74	118.80	3,199.78	-15.62	14.36	-15.12	0.88	0.00	-68.04
3,225.00	0.76	118.57	3,224.78	-15.78	14.65	-15.27	0.08	0.08	-0.92
3,250.00	0.88	114.36	3,249.78	-15.94	14.97	-15.41	0.54	0.48	-16.84
3,275.00	0.94	110.59	3,274.77	-16.09	15.33	-15.55	0.34	0.24	-15.08
3,300.00	0.70	116.11	3,299.77	-16.23	15.66	-15.68	1.01	-0.96	22.08
3,325.00	0.48	110.10	3,324.77	-16.33	15.90	-15.77	0.91	-0.88	-24.04
3,350.00	0.45	98.61	3,349.77	-16.38	16.09	-15.82	0.39	-0.12	-45.96
3,375.00	0.37	98.91	3,374.77	-16.41	16.27	-15.84	0.32	-0.32	1.20
3,400.00	0.51	88.86	3,399.77	-16.42	16.46	-15.84	0.64	0.56	-40.20
3,425.00	0.51	82.12	3,424.77	-16.40	16.68	-15.82	0.24	0.00	-26.96
3,450.00	0.63	91.77	3,449.77	-16.39	16.93	-15.80	0.61	0.48	38.60
3,475.00	0.73	103.00	3,474.76	-16.43	17.22	-15.83	0.66	0.40	44.92
3,500.00	0.96	111.88	3,499.76	-16.55	17.57	-15.93	1.06	0.92	35.52
3,525.00	0.98	118.15	3,524.76	-16.73	17.96	-16.10	0.43	0.08	25.08
3,550.00	0.96	121.83	3,549.75	-16.94	18.32	-16.29	0.26	-0.08	14.72



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Fez Federal Com
Well: 701H
Wellbore: OH / 64018
Design: Surveys (McVay 8)

Local Co-ordinate Reference: Well 701H
TVD Reference: RKB @ 3269.60usft (McVay 8)
MD Reference: RKB @ 3269.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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	0.91	123.99	3,574.75	-17.16	18.66	-16.50	0.24	-0.20	8.64
3,600.00	0.92	117.59	3,599.75	-17.36	19.01	-16.70	0.41	0.04	-25.60
3,625.00	0.84	115.80	3,624.74	-17.54	19.35	-16.86	0.34	-0.32	-7.16
3,650.00	0.89	104.97	3,649.74	-17.67	19.70	-16.97	0.68	0.20	-43.32
3,675.00	0.74	120.64	3,674.74	-17.80	20.03	-17.09	1.07	-0.60	62.68
3,700.00	0.72	118.65	3,699.74	-17.96	20.31	-17.24	0.13	-0.08	-7.96
3,725.00	0.64	123.80	3,724.74	-18.11	20.56	-17.39	0.40	-0.32	20.60
3,750.00	0.70	121.61	3,749.73	-18.27	20.81	-17.54	0.26	0.24	-8.76
3,775.00	0.61	121.66	3,774.73	-18.42	21.05	-17.68	0.36	-0.36	0.20
3,800.00	0.67	112.54	3,799.73	-18.54	21.30	-17.79	0.47	0.24	-36.48
3,825.00	0.70	109.66	3,824.73	-18.65	21.58	-17.89	0.18	0.12	-11.52
3,850.00	0.74	112.93	3,849.73	-18.76	21.87	-18.00	0.23	0.16	13.08
3,875.00	0.88	116.36	3,874.72	-18.91	22.19	-18.13	0.59	0.56	13.72
3,900.00	0.76	123.12	3,899.72	-19.09	22.50	-18.30	0.62	-0.48	27.04
3,925.00	0.84	118.57	3,924.72	-19.27	22.80	-18.47	0.41	0.32	-18.20
3,950.00	0.71	122.93	3,949.72	-19.44	23.09	-18.63	0.57	-0.52	17.44
3,975.00	0.75	122.99	3,974.71	-19.61	23.36	-18.79	0.16	0.16	0.24
4,000.00	0.73	119.70	3,999.71	-19.78	23.63	-18.95	0.19	-0.08	-13.16
4,025.00	0.70	122.32	4,024.71	-19.94	23.90	-19.10	0.18	-0.12	10.48
4,050.00	0.75	117.77	4,049.71	-20.10	24.17	-19.25	0.30	0.20	-18.20
4,075.00	0.94	122.19	4,074.71	-20.28	24.49	-19.42	0.80	0.76	17.68
4,100.00	1.12	127.48	4,099.70	-20.54	24.86	-19.67	0.81	0.72	21.16
4,125.00	1.26	132.07	4,124.70	-20.87	25.26	-19.99	0.68	0.56	18.36
4,150.00	1.48	120.84	4,149.69	-21.22	25.74	-20.32	1.38	0.88	-44.92
4,175.00	1.85	113.37	4,174.68	-21.55	26.39	-20.62	1.71	1.48	-29.88
4,200.00	2.27	107.75	4,199.66	-21.86	27.23	-20.91	1.86	1.68	-22.48
4,225.00	2.45	106.71	4,224.64	-22.16	28.21	-21.18	0.74	0.72	-4.16
4,250.00	2.52	105.28	4,249.62	-22.46	29.25	-21.44	0.37	0.28	-5.72
4,275.00	2.48	103.57	4,274.59	-22.73	30.31	-21.67	0.34	-0.16	-6.84
4,300.00	2.38	104.99	4,299.57	-23.00	31.34	-21.90	0.47	-0.40	5.68
4,325.00	2.46	103.90	4,324.55	-23.26	32.36	-22.13	0.37	0.32	-4.36
4,350.00	2.07	107.79	4,349.53	-23.53	33.31	-22.36	1.68	-1.56	15.56
4,375.00	1.60	114.50	4,374.52	-23.81	34.06	-22.62	2.06	-1.88	26.84
4,400.00	1.12	124.89	4,399.51	-24.09	34.58	-22.88	2.15	-1.92	41.56
4,425.00	0.96	125.87	4,424.51	-24.36	34.95	-23.13	0.64	-0.64	3.92
4,450.00	0.99	122.84	4,449.50	-24.60	35.30	-23.36	0.24	0.12	-12.12
4,475.00	0.97	120.84	4,474.50	-24.82	35.66	-23.57	0.16	-0.08	-8.00
4,500.00	0.89	122.22	4,499.50	-25.03	36.01	-23.77	0.33	-0.32	5.52
4,525.00	0.85	118.94	4,524.49	-25.23	36.33	-23.96	0.26	-0.16	-13.12
4,550.00	0.95	118.91	4,549.49	-25.42	36.68	-24.13	0.40	0.40	-0.12
4,575.00	1.10	118.16	4,574.49	-25.63	37.07	-24.33	0.60	0.60	-3.00
4,600.00	0.96	122.23	4,599.48	-25.85	37.46	-24.54	0.63	-0.56	16.28
4,625.00	0.90	118.83	4,624.48	-26.06	37.81	-24.74	0.33	-0.24	-13.60



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Fez Federal Com
Well: 701H
Wellbore: OH / 64018
Design: Surveys (McVay 8)

Local Co-ordinate Reference: Well 701H
TVD Reference: RKB @ 3269.60usft (McVay 8)
MD Reference: RKB @ 3269.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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	0.81	135.57	4,649.48	-26.28	38.10	-24.95	1.06	-0.36	66.96
4,675.00	0.82	159.49	4,674.47	-26.58	38.29	-25.24	1.35	0.04	95.68
4,700.00	0.94	173.47	4,699.47	-26.95	38.38	-25.60	0.98	0.48	55.92
4,725.00	1.03	178.04	4,724.47	-27.37	38.41	-26.03	0.48	0.36	18.28
4,750.00	1.25	174.56	4,749.46	-27.87	38.44	-26.53	0.92	0.88	-13.92
4,775.00	1.37	172.34	4,774.45	-28.44	38.51	-27.09	0.52	0.48	-8.88
4,800.00	1.50	174.06	4,799.45	-29.06	38.58	-27.71	0.55	0.52	6.88
4,825.00	1.46	170.92	4,824.44	-29.70	38.66	-28.35	0.36	-0.16	-12.56
4,850.00	1.46	161.27	4,849.43	-30.32	38.82	-28.96	0.98	0.00	-38.60
4,875.00	1.38	152.47	4,874.42	-30.88	39.06	-29.52	0.93	-0.32	-35.20
4,900.00	1.16	134.08	4,899.42	-31.33	39.38	-29.95	1.84	-0.88	-73.56
4,925.00	1.09	115.30	4,924.41	-31.61	39.78	-30.21	1.49	-0.28	-75.12
4,950.00	1.05	110.03	4,949.41	-31.79	40.21	-30.38	0.42	-0.16	-21.08
4,975.00	0.98	112.93	4,974.40	-31.95	40.62	-30.52	0.35	-0.28	11.60
5,000.00	1.00	105.49	4,999.40	-32.09	41.02	-30.65	0.52	0.08	-29.76
5,025.00	0.93	106.91	5,024.40	-32.21	41.43	-30.76	0.30	-0.28	5.68
5,050.00	1.01	99.13	5,049.39	-32.30	41.84	-30.84	0.62	0.32	-31.12
5,075.00	0.94	113.08	5,074.39	-32.42	42.25	-30.94	0.99	-0.28	55.80
5,100.00	0.97	110.09	5,099.39	-32.57	42.63	-31.08	0.23	0.12	-11.96
5,125.00	0.82	111.90	5,124.38	-32.71	43.00	-31.20	0.61	-0.60	7.24
5,150.00	0.73	105.65	5,149.38	-32.82	43.32	-31.30	0.49	-0.36	-25.00
5,175.00	0.74	97.86	5,174.38	-32.88	43.63	-31.36	0.40	0.04	-31.16
5,200.00	0.83	100.87	5,199.38	-32.94	43.97	-31.40	0.40	0.36	12.04
5,225.00	0.75	109.08	5,224.37	-33.03	44.30	-31.48	0.55	-0.32	32.84
5,250.00	0.66	111.00	5,249.37	-33.13	44.59	-31.57	0.37	-0.36	7.68
5,275.00	0.55	127.81	5,274.37	-33.26	44.82	-31.69	0.83	-0.44	67.24
5,300.00	0.47	133.96	5,299.37	-33.40	44.99	-31.83	0.39	-0.32	24.60
5,325.00	0.45	136.04	5,324.37	-33.54	45.13	-31.96	0.10	-0.08	8.32
5,350.00	0.48	138.52	5,349.37	-33.69	45.27	-32.11	0.14	0.12	9.92
5,375.00	0.51	122.75	5,374.37	-33.83	45.43	-32.24	0.56	0.12	-63.08
5,400.00	0.59	130.31	5,399.37	-33.97	45.62	-32.38	0.43	0.32	30.24
5,425.00	0.67	126.99	5,424.36	-34.15	45.84	-32.54	0.35	0.32	-13.28
5,450.00	0.56	120.87	5,449.36	-34.30	46.06	-32.68	0.51	-0.44	-24.48
5,475.00	0.62	130.26	5,474.36	-34.45	46.27	-32.83	0.45	0.24	37.56
5,500.00	0.58	135.66	5,499.36	-34.62	46.46	-33.00	0.28	-0.16	21.60
5,525.00	0.54	126.71	5,524.36	-34.79	46.64	-33.15	0.38	-0.16	-35.80
5,550.00	0.63	115.99	5,549.36	-34.92	46.86	-33.28	0.57	0.36	-42.88
5,575.00	0.57	136.16	5,574.36	-35.07	47.07	-33.42	0.87	-0.24	80.68
5,600.00	0.52	125.85	5,599.35	-35.22	47.25	-33.57	0.44	-0.20	-41.24
5,625.00	0.53	129.09	5,624.35	-35.36	47.43	-33.70	0.13	0.04	12.96
5,650.00	0.58	142.62	5,649.35	-35.53	47.60	-33.87	0.56	0.20	54.12
5,675.00	0.55	143.69	5,674.35	-35.73	47.74	-34.06	0.13	-0.12	4.28
5,700.00	0.45	140.88	5,699.35	-35.90	47.88	-34.23	0.41	-0.40	-11.24

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 701H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3269.60usft (McVay 8)
Site:	Fez Federal Com	MD Reference:	RKB @ 3269.60usft (McVay 8)
Well:	701H	North Reference:	Grid
Wellbore:	OH / 64018	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,725.00	0.43	137.43	5,724.35	-36.05	48.00	-34.37	0.13	-0.08	-13.80
5,750.00	0.52	115.94	5,749.35	-36.17	48.17	-34.48	0.79	0.36	-85.96
5,775.00	0.59	137.13	5,774.35	-36.31	48.36	-34.62	0.86	0.28	84.76
5,800.00	0.48	144.14	5,799.35	-36.49	48.51	-34.79	0.51	-0.44	28.04
5,825.00	0.50	133.81	5,824.35	-36.65	48.65	-34.95	0.36	0.08	-41.32
5,850.00	0.78	121.23	5,849.34	-36.82	48.87	-35.11	1.25	1.12	-50.32
5,875.00	1.22	114.73	5,874.34	-37.02	49.26	-35.29	1.81	1.76	-26.00
5,900.00	1.79	117.24	5,899.33	-37.31	49.85	-35.56	2.29	2.28	10.04
5,925.00	1.87	112.33	5,924.32	-37.64	50.57	-35.87	0.70	0.32	-19.64
5,950.00	1.93	107.06	5,949.31	-37.92	51.35	-36.12	0.74	0.24	-21.08
5,975.00	2.05	109.34	5,974.29	-38.19	52.18	-36.36	0.57	0.48	9.12
6,000.00	2.04	110.41	5,999.27	-38.49	53.01	-36.64	0.16	-0.04	4.28
6,025.00	2.05	108.34	6,024.26	-38.79	53.86	-36.90	0.30	0.04	-8.28
6,050.00	2.40	105.43	6,049.24	-39.07	54.78	-37.15	1.47	1.40	-11.64
6,075.00	2.43	108.60	6,074.22	-39.38	55.79	-37.43	0.55	0.12	12.68
6,100.00	2.41	106.35	6,099.19	-39.69	56.80	-37.71	0.39	-0.08	-9.00
6,125.00	2.66	110.16	6,124.17	-40.04	57.85	-38.02	1.21	1.00	15.24
6,150.00	3.17	114.95	6,149.14	-40.53	59.02	-38.47	2.26	2.04	19.16
6,175.00	3.39	116.66	6,174.10	-41.16	60.31	-39.05	0.96	0.88	6.84
6,200.00	3.50	114.60	6,199.05	-41.81	61.66	-39.65	0.66	0.44	-8.24
6,225.00	3.51	118.89	6,224.01	-42.49	63.02	-40.29	1.05	0.04	17.16
6,250.00	3.49	116.89	6,248.96	-43.21	64.37	-40.96	0.49	-0.08	-8.00
6,275.00	3.48	114.68	6,273.91	-43.87	65.74	-41.57	0.54	-0.04	-8.84
6,300.00	3.59	115.31	6,298.86	-44.52	67.14	-42.17	0.47	0.44	2.52
6,325.00	3.57	116.53	6,323.82	-45.20	68.54	-42.81	0.32	-0.08	4.88
6,350.00	3.57	117.06	6,348.77	-45.90	69.93	-43.46	0.13	0.00	2.12
6,375.00	3.47	116.33	6,373.72	-46.59	71.30	-44.10	0.44	-0.40	-2.92
6,400.00	3.56	115.11	6,398.67	-47.26	72.68	-44.72	0.47	0.36	-4.88
6,425.00	4.34	117.23	6,423.61	-48.02	74.23	-45.43	3.17	3.12	8.48
6,450.00	4.72	119.02	6,448.54	-48.95	75.97	-46.30	1.62	1.52	7.16
6,475.00	4.81	119.53	6,473.45	-49.97	77.78	-47.25	0.40	0.36	2.04
6,500.00	4.74	119.52	6,498.36	-50.99	79.59	-48.21	0.28	-0.28	-0.04
6,525.00	4.78	119.20	6,523.28	-52.01	81.40	-49.17	0.19	0.16	-1.28
6,550.00	4.80	120.55	6,548.19	-53.05	83.21	-50.14	0.46	0.08	5.40
6,575.00	4.93	120.74	6,573.10	-54.13	85.03	-51.16	0.52	0.52	0.76
6,600.00	4.84	121.06	6,598.01	-55.22	86.86	-52.19	0.38	-0.36	1.28
6,625.00	4.65	119.52	6,622.92	-56.27	88.64	-53.17	0.91	-0.76	-6.16
6,650.00	4.81	119.59	6,647.84	-57.28	90.44	-54.13	0.64	0.64	0.28
6,675.00	4.73	120.61	6,672.75	-58.33	92.24	-55.11	0.47	-0.32	4.08
6,700.00	4.71	121.42	6,697.67	-59.39	94.00	-56.10	0.28	-0.08	3.24
6,725.00	4.65	119.32	6,722.58	-60.42	95.76	-57.07	0.73	-0.24	-8.40
6,750.00	4.76	121.50	6,747.50	-61.46	97.53	-58.05	0.84	0.44	8.72
6,775.00	4.65	121.32	6,772.41	-62.53	99.28	-59.06	0.44	-0.44	-0.72
6,800.00	4.57	119.61	6,797.33	-63.54	101.01	-60.02	0.64	-0.32	-6.84



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Fez Federal Com
Well: 701H
Wellbore: OH / 64018
Design: Surveys (McVay 8)

Local Co-ordinate Reference: Well 701H
TVD Reference: RKB @ 3269.60usft (McVay 8)
MD Reference: RKB @ 3269.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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	4.64	118.74	6,822.25	-64.52	102.76	-60.93	0.40	0.28	-3.48
6,850.00	4.51	121.08	6,847.17	-65.52	104.49	-61.87	0.91	-0.52	9.36
6,875.00	4.25	119.34	6,872.10	-66.48	106.14	-62.77	1.17	-1.04	-6.96
6,900.00	4.32	120.40	6,897.03	-67.41	107.76	-63.64	0.42	0.28	4.24
6,925.00	4.11	120.62	6,921.96	-68.34	109.34	-64.52	0.84	-0.84	0.88
6,950.00	4.19	123.26	6,946.90	-69.30	110.88	-65.43	0.83	0.32	10.56
6,975.00	3.98	122.07	6,971.83	-70.26	112.38	-66.33	0.91	-0.84	-4.76
7,000.00	3.91	118.11	6,996.77	-71.12	113.86	-67.15	1.12	-0.28	-15.84
7,025.00	3.82	120.52	7,021.72	-71.95	115.33	-67.92	0.74	-0.36	9.64
7,050.00	3.64	118.47	7,046.66	-72.75	116.75	-68.67	0.90	-0.72	-8.20
7,075.00	3.51	119.49	7,071.62	-73.50	118.11	-69.38	0.58	-0.52	4.08
7,100.00	3.46	118.98	7,096.57	-74.24	119.44	-70.07	0.24	-0.20	-2.04
7,125.00	3.42	118.69	7,121.52	-74.97	120.75	-70.75	0.17	-0.16	-1.16
7,150.00	3.39	117.20	7,146.48	-75.66	122.06	-71.40	0.37	-0.12	-5.96
7,175.00	3.39	114.65	7,171.44	-76.31	123.39	-72.00	0.60	0.00	-10.20
7,200.00	3.52	110.80	7,196.39	-76.89	124.78	-72.53	1.06	0.52	-15.40
7,225.00	3.62	110.46	7,221.34	-77.44	126.24	-73.03	0.41	0.40	-1.36
7,250.00	3.68	110.25	7,246.29	-77.99	127.73	-73.53	0.25	0.24	-0.84
7,275.00	3.61	111.16	7,271.24	-78.55	129.22	-74.04	0.36	-0.28	3.64
7,300.00	3.56	111.30	7,296.19	-79.12	130.67	-74.56	0.20	-0.20	0.56
7,325.00	3.58	111.90	7,321.14	-79.69	132.12	-75.08	0.17	0.08	2.40
7,350.00	3.31	111.08	7,346.10	-80.24	133.52	-75.58	1.10	-1.08	-3.28
7,375.00	3.16	112.15	7,371.06	-80.76	134.83	-76.06	0.65	-0.60	4.28
7,400.00	3.14	111.82	7,396.02	-81.28	136.10	-76.53	0.11	-0.08	-1.32
7,425.00	3.15	112.25	7,420.98	-81.79	137.38	-77.00	0.10	0.04	1.72
7,450.00	3.21	110.08	7,445.94	-82.29	138.67	-77.45	0.54	0.24	-8.68
7,475.00	3.30	110.25	7,470.90	-82.78	140.00	-77.90	0.36	0.36	0.68
7,500.00	3.69	115.49	7,495.86	-83.38	141.40	-78.44	2.01	1.56	20.96
7,525.00	3.83	117.62	7,520.80	-84.11	142.87	-79.12	0.79	0.56	8.52
7,550.00	3.79	117.69	7,545.75	-84.88	144.34	-79.84	0.16	-0.16	0.28
7,575.00	3.76	117.37	7,570.69	-85.64	145.80	-80.55	0.15	-0.12	-1.28
7,600.00	3.79	116.38	7,595.64	-86.39	147.27	-81.25	0.29	0.12	-3.96
7,625.00	3.75	116.33	7,620.59	-87.12	148.74	-81.93	0.16	-0.16	-0.20
7,650.00	3.56	116.75	7,645.54	-87.83	150.17	-82.59	0.77	-0.76	1.68
7,675.00	3.31	117.47	7,670.49	-88.51	151.50	-83.22	1.01	-1.00	2.88
7,700.00	3.21	119.22	7,695.45	-89.19	152.75	-83.85	0.56	-0.40	7.00
7,725.00	3.22	118.87	7,720.41	-89.87	153.98	-84.49	0.09	0.04	-1.40
7,750.00	3.27	117.51	7,745.37	-90.53	155.22	-85.12	0.37	0.20	-5.44
7,775.00	3.37	121.48	7,770.33	-91.25	156.48	-85.79	1.00	0.40	15.88
7,800.00	3.34	122.26	7,795.29	-92.02	157.73	-86.52	0.22	-0.12	3.12
7,825.00	3.28	120.85	7,820.24	-92.78	158.96	-87.23	0.40	-0.24	-5.64
7,850.00	3.23	119.50	7,845.20	-93.49	160.18	-87.90	0.37	-0.20	-5.40
7,875.00	3.06	118.73	7,870.17	-94.16	161.38	-88.52	0.70	-0.68	-3.08



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Fez Federal Com
Well: 701H
Wellbore: OH / 64018
Design: Surveys (McVay 8)

Local Co-ordinate Reference: Well 701H
TVD Reference: RKB @ 3269.60usft (McVay 8)
MD Reference: RKB @ 3269.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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	2.93	119.75	7,895.13	-94.79	162.52	-89.12	0.56	-0.52	4.08
7,925.00	2.84	120.11	7,920.10	-95.42	163.61	-89.71	0.37	-0.36	1.44
7,950.00	2.86	118.45	7,945.07	-96.03	164.69	-90.28	0.34	0.08	-6.64
7,975.00	3.16	116.07	7,970.04	-96.63	165.86	-90.84	1.30	1.20	-9.52
8,000.00	3.26	117.66	7,995.00	-97.26	167.11	-91.43	0.54	0.40	6.36
8,025.00	3.35	116.02	8,019.95	-97.91	168.40	-92.04	0.52	0.36	-6.56
8,050.00	3.62	113.47	8,044.91	-98.55	169.78	-92.62	1.25	1.08	-10.20
8,075.00	3.83	110.93	8,069.86	-99.16	171.28	-93.18	1.07	0.84	-10.16
8,100.00	3.97	111.40	8,094.80	-99.77	172.87	-93.74	0.57	0.56	1.88
8,125.00	3.97	111.96	8,119.74	-100.41	174.47	-94.33	0.16	0.00	2.24
8,150.00	3.84	112.29	8,144.68	-101.06	176.05	-94.91	0.53	-0.52	1.32
8,175.00	3.63	110.72	8,169.63	-101.65	177.57	-95.46	0.93	-0.84	-6.28
8,200.00	3.36	109.99	8,194.58	-102.18	179.00	-95.94	1.09	-1.08	-2.92
8,225.00	3.35	109.65	8,219.54	-102.68	180.37	-96.39	0.09	-0.04	-1.36
8,250.00	3.32	111.12	8,244.49	-103.19	181.74	-96.84	0.36	-0.12	5.88
8,275.00	3.26	109.03	8,269.45	-103.68	183.08	-97.29	0.54	-0.24	-8.36
8,300.00	3.23	109.69	8,294.41	-104.15	184.42	-97.71	0.19	-0.12	2.64
8,325.00	3.51	108.77	8,319.37	-104.63	185.81	-98.15	1.14	1.12	-3.68
8,350.00	4.22	107.55	8,344.31	-105.15	187.41	-98.62	2.86	2.84	-4.88
8,375.00	4.27	108.10	8,369.24	-105.72	189.17	-99.12	0.26	0.20	2.20
8,400.00	4.23	107.74	8,394.18	-106.29	190.93	-99.63	0.19	-0.16	-1.44
8,425.00	4.24	105.64	8,419.11	-106.82	192.70	-100.10	0.62	0.04	-8.40
8,450.00	4.36	106.46	8,444.04	-107.34	194.50	-100.56	0.54	0.48	3.28
8,475.00	4.25	107.67	8,468.97	-107.89	196.29	-101.04	0.57	-0.44	4.84
8,500.00	4.07	108.01	8,493.90	-108.45	198.02	-101.54	0.73	-0.72	1.36
8,525.00	3.95	107.68	8,518.84	-108.98	199.69	-102.02	0.49	-0.48	-1.32
8,550.00	3.93	109.01	8,543.78	-109.52	201.32	-102.50	0.37	-0.08	5.32
8,575.00	3.89	108.69	8,568.72	-110.07	202.93	-103.00	0.18	-0.16	-1.28
8,600.00	3.92	108.94	8,593.66	-110.62	204.54	-103.49	0.14	0.12	1.00
8,625.00	4.05	111.11	8,618.60	-111.22	206.17	-104.03	0.80	0.52	8.68
8,650.00	4.22	111.38	8,643.54	-111.87	207.85	-104.62	0.68	0.68	1.08
8,675.00	4.30	112.07	8,668.47	-112.56	209.58	-105.25	0.38	0.32	2.76
8,700.00	4.22	111.63	8,693.40	-113.25	211.30	-105.88	0.35	-0.32	-1.76
8,725.00	4.19	111.99	8,718.33	-113.93	213.00	-106.50	0.16	-0.12	1.44
8,750.00	4.23	112.64	8,743.27	-114.63	214.70	-107.14	0.25	0.16	2.60
8,775.00	4.12	114.92	8,768.20	-115.36	216.37	-107.82	0.80	-0.44	9.12
8,800.00	3.90	116.27	8,793.14	-116.12	217.94	-108.52	0.96	-0.88	5.40
8,825.00	3.70	115.68	8,818.08	-116.84	219.43	-109.19	0.82	-0.80	-2.36
8,850.00	3.73	115.90	8,843.03	-117.55	220.89	-109.84	0.13	0.12	0.88
8,875.00	3.58	118.89	8,867.98	-118.28	222.31	-110.53	0.97	-0.60	11.96
8,900.00	3.48	120.19	8,892.93	-119.04	223.65	-111.24	0.51	-0.40	5.20
8,925.00	3.31	122.85	8,917.89	-119.81	224.91	-111.97	0.93	-0.68	10.64
8,950.00	3.20	125.94	8,942.85	-120.61	226.08	-112.73	0.83	-0.44	12.36



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 701H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3269.60usft (McVay 8)
Site:	Fez Federal Com	MD Reference:	RKB @ 3269.60usft (McVay 8)
Well:	701H	North Reference:	Grid
Wellbore:	OH / 64018	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,975.00	3.16	124.93	8,967.81	-121.41	227.21	-113.49	0.28	-0.16	-4.04
9,000.00	3.14	129.36	8,992.77	-122.24	228.30	-114.28	0.98	-0.08	17.72
9,025.00	3.09	129.39	9,017.73	-123.11	229.35	-115.11	0.20	-0.20	0.12
9,050.00	3.27	133.11	9,042.70	-124.02	230.39	-115.99	1.09	0.72	14.88
9,075.00	3.22	136.97	9,067.66	-125.02	231.39	-116.95	0.90	-0.20	15.44
9,100.00	3.12	140.09	9,092.62	-126.06	232.31	-117.95	0.80	-0.40	12.48
9,125.00	3.26	142.60	9,117.58	-127.14	233.18	-119.01	0.79	0.56	10.04
9,150.00	3.31	149.14	9,142.54	-128.33	233.98	-120.17	1.51	0.20	26.16
9,175.00	3.21	151.54	9,167.50	-129.56	234.68	-121.38	0.68	-0.40	9.60
9,200.00	3.24	152.28	9,192.46	-130.80	235.35	-122.59	0.21	0.12	2.96
9,225.00	3.25	154.06	9,217.42	-132.07	235.98	-123.83	0.40	0.04	7.12
9,250.00	3.28	159.94	9,242.38	-133.37	236.54	-125.12	1.34	0.12	23.52
9,275.00	3.34	164.36	9,267.34	-134.75	236.98	-126.48	1.05	0.24	17.68
9,300.00	3.25	166.31	9,292.29	-136.14	237.35	-127.86	0.57	-0.36	7.80
9,325.00	3.19	165.78	9,317.26	-137.50	237.68	-129.21	0.27	-0.24	-2.12
9,350.00	3.33	168.29	9,342.21	-138.89	238.00	-130.58	0.80	0.56	10.04
9,375.00	3.30	169.15	9,367.17	-140.30	238.28	-131.99	0.23	-0.12	3.44
9,400.00	3.38	166.03	9,392.13	-141.72	238.60	-133.40	0.79	0.32	-12.48
9,425.00	3.48	169.48	9,417.09	-143.19	238.91	-134.85	0.92	0.40	13.80
9,450.00	3.33	170.17	9,442.04	-144.65	239.18	-136.30	0.62	-0.60	2.76
9,475.00	3.19	170.75	9,467.00	-146.05	239.41	-137.69	0.58	-0.56	2.32
9,500.00	3.05	168.60	9,491.96	-147.39	239.66	-139.02	0.73	-0.56	-8.60
9,525.00	3.01	170.27	9,516.93	-148.69	239.90	-140.31	0.39	-0.16	6.68
9,550.00	2.87	171.90	9,541.90	-149.95	240.10	-141.57	0.65	-0.56	6.52
9,575.00	2.70	172.04	9,566.87	-151.16	240.27	-142.76	0.68	-0.68	0.56
9,600.00	2.42	169.86	9,591.84	-152.26	240.44	-143.86	1.19	-1.12	-8.72
9,625.00	2.32	166.94	9,616.82	-153.27	240.65	-144.87	0.63	-0.40	-11.68
9,650.00	2.29	169.70	9,641.80	-154.26	240.85	-145.84	0.46	-0.12	11.04
9,675.00	2.01	170.21	9,666.78	-155.18	241.02	-146.76	1.12	-1.12	2.04
9,700.00	1.83	170.44	9,691.77	-156.00	241.16	-147.58	0.72	-0.72	0.92
9,725.00	1.55	167.33	9,716.76	-156.73	241.30	-148.30	1.18	-1.12	-12.44
9,750.00	1.49	166.41	9,741.75	-157.37	241.45	-148.94	0.26	-0.24	-3.68
9,775.00	1.47	170.14	9,766.74	-158.01	241.58	-149.56	0.39	-0.08	14.92
9,800.00	1.34	175.94	9,791.73	-158.61	241.66	-150.17	0.77	-0.52	23.20
9,825.00	1.16	177.72	9,816.73	-159.16	241.69	-150.71	0.74	-0.72	7.12
9,850.00	1.14	169.69	9,841.72	-159.66	241.74	-151.21	0.65	-0.08	-32.12
9,875.00	1.17	171.29	9,866.72	-160.15	241.82	-151.70	0.18	0.12	6.40
9,900.00	1.08	175.90	9,891.71	-160.64	241.88	-152.19	0.51	-0.36	18.44
9,925.00	0.91	175.88	9,916.71	-161.07	241.91	-152.62	0.68	-0.68	-0.08
9,950.00	0.82	178.97	9,941.71	-161.45	241.93	-152.99	0.41	-0.36	12.36
9,975.00	0.77	184.04	9,966.70	-161.80	241.92	-153.34	0.35	-0.20	20.28
10,000.00	0.58	192.63	9,991.70	-162.09	241.88	-153.63	0.86	-0.76	34.36
10,025.00	0.50	204.11	10,016.70	-162.31	241.81	-153.86	0.54	-0.32	45.92
10,050.00	0.50	219.53	10,041.70	-162.49	241.69	-154.05	0.54	0.00	61.68



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 701H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3269.60usft (McVay 8)
Site:	Fez Federal Com	MD Reference:	RKB @ 3269.60usft (McVay 8)
Well:	701H	North Reference:	Grid
Wellbore:	OH / 64018	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,075.00	0.45	236.06	10,066.70	-162.63	241.54	-154.19	0.58	-0.20	66.12
10,100.00	0.52	261.52	10,091.70	-162.70	241.35	-154.27	0.90	0.28	101.84
10,125.00	0.57	267.41	10,116.70	-162.73	241.11	-154.30	0.30	0.20	23.56
10,150.00	0.61	272.18	10,141.70	-162.73	240.86	-154.31	0.25	0.16	19.08
10,175.00	0.62	278.95	10,166.69	-162.70	240.59	-154.29	0.29	0.04	27.08
10,200.00	0.64	286.74	10,191.69	-162.64	240.32	-154.24	0.35	0.08	31.16
10,225.00	0.69	291.66	10,216.69	-162.54	240.05	-154.15	0.30	0.20	19.68
10,250.00	0.74	287.32	10,241.69	-162.44	239.75	-154.06	0.29	0.20	-17.36
10,275.00	0.78	286.42	10,266.69	-162.34	239.44	-153.97	0.17	0.16	-3.60
10,300.00	0.74	280.01	10,291.68	-162.27	239.11	-153.91	0.38	-0.16	-25.64
10,325.00	0.66	287.02	10,316.68	-162.20	238.82	-153.85	0.47	-0.32	28.04
10,350.00	0.64	290.42	10,341.68	-162.11	238.55	-153.77	0.17	-0.08	13.60
10,375.00	0.75	288.19	10,366.68	-162.01	238.26	-153.68	0.45	0.44	-8.92
10,400.00	0.79	289.46	10,391.68	-161.90	237.94	-153.58	0.17	0.16	5.08
10,425.00	0.77	282.81	10,416.67	-161.80	237.62	-153.50	0.37	-0.08	-26.60
10,450.00	0.70	289.28	10,441.67	-161.72	237.31	-153.42	0.43	-0.28	25.88
10,475.00	0.69	287.38	10,466.67	-161.62	237.02	-153.34	0.10	-0.04	-7.60
10,500.00	0.83	285.91	10,491.67	-161.53	236.71	-153.25	0.57	0.56	-5.88
10,525.00	0.81	279.51	10,516.67	-161.45	236.36	-153.18	0.37	-0.08	-25.60
10,550.00	0.72	279.02	10,541.66	-161.39	236.03	-153.14	0.36	-0.36	-1.96
10,575.00	0.93	288.43	10,566.66	-161.30	235.68	-153.07	1.00	0.84	37.64
10,600.00	1.08	285.65	10,591.66	-161.18	235.26	-152.95	0.63	0.60	-11.12
10,625.00	1.01	282.87	10,616.65	-161.06	234.82	-152.86	0.35	-0.28	-11.12
10,650.00	1.11	288.05	10,641.65	-160.94	234.37	-152.75	0.55	0.40	20.72
10,675.00	1.16	283.23	10,666.64	-160.81	233.90	-152.63	0.43	0.20	-19.28
10,700.00	1.09	286.82	10,691.64	-160.68	233.42	-152.52	0.40	-0.28	14.36
10,725.00	1.23	285.82	10,716.63	-160.54	232.94	-152.39	0.57	0.56	-4.00
10,750.00	1.11	285.48	10,741.63	-160.40	232.45	-152.27	0.48	-0.48	-1.36
10,775.00	1.25	283.94	10,766.62	-160.27	231.95	-152.16	0.57	0.56	-6.16
10,800.00	1.16	288.83	10,791.62	-160.12	231.44	-152.03	0.55	-0.36	19.56
10,825.00	1.15	288.74	10,816.61	-159.96	230.97	-151.89	0.04	-0.04	-0.36
10,850.00	1.32	284.85	10,841.61	-159.81	230.45	-151.75	0.76	0.68	-15.56
10,875.00	1.21	279.77	10,866.60	-159.69	229.91	-151.65	0.63	-0.44	-20.32
10,900.00	1.37	281.04	10,891.59	-159.59	229.36	-151.57	0.65	0.64	5.08
10,925.00	1.27	286.20	10,916.59	-159.45	228.80	-151.45	0.62	-0.40	20.64
10,950.00	1.36	282.41	10,941.58	-159.31	228.24	-151.33	0.50	0.36	-15.16
10,975.00	1.46	281.89	10,966.57	-159.18	227.64	-151.22	0.40	0.40	-2.08
11,000.00	1.60	280.84	10,991.56	-159.05	226.99	-151.11	0.57	0.56	-4.20
11,025.00	2.16	277.52	11,016.55	-158.92	226.18	-151.01	2.28	2.24	-13.28
11,050.00	2.71	277.40	11,041.53	-158.78	225.12	-150.91	2.20	2.20	-0.48
11,075.00	3.28	273.88	11,066.49	-158.66	223.82	-150.83	2.39	2.28	-14.08
11,100.00	3.64	279.88	11,091.45	-158.48	222.33	-150.70	2.04	1.44	24.00
11,125.00	4.22	278.25	11,116.39	-158.21	220.64	-150.49	2.36	2.32	-6.52



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 701H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3269.60usft (McVay 8)
Site:	Fez Federal Com	MD Reference:	RKB @ 3269.60usft (McVay 8)
Well:	701H	North Reference:	Grid
Wellbore:	OH / 64018	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,150.00	4.61	277.63	11,141.32	-157.94	218.73	-150.29	1.57	1.56	-2.48
11,175.00	5.02	278.70	11,166.23	-157.64	216.65	-150.06	1.68	1.64	4.28
11,200.00	5.60	278.43	11,191.12	-157.30	214.37	-149.80	2.32	2.32	-1.08
11,225.00	5.78	279.54	11,216.00	-156.91	211.92	-149.50	0.84	0.72	4.44
11,250.00	5.97	279.59	11,240.87	-156.49	209.40	-149.16	0.76	0.76	0.20
11,275.00	6.17	279.19	11,265.73	-156.06	206.79	-148.82	0.82	0.80	-1.60
11,300.00	6.37	280.63	11,290.58	-155.58	204.10	-148.44	1.02	0.80	5.76
11,325.00	6.51	280.95	11,315.42	-155.06	201.34	-148.01	0.58	0.56	1.28
11,350.00	6.40	281.09	11,340.26	-154.52	198.58	-147.57	0.44	-0.44	0.56
11,375.00	6.03	282.44	11,365.11	-153.97	195.93	-147.11	1.59	-1.48	5.40
11,400.00	6.00	284.54	11,389.97	-153.36	193.39	-146.59	0.89	-0.12	8.40
11,425.00	5.91	285.47	11,414.84	-152.69	190.88	-146.00	0.53	-0.36	3.72
11,450.00	5.61	285.61	11,439.71	-152.02	188.47	-145.41	1.20	-1.20	0.56
11,475.00	5.42	285.38	11,464.60	-151.38	186.15	-144.85	0.77	-0.76	-0.92
11,500.00	5.39	283.54	11,489.49	-150.79	183.87	-144.34	0.70	-0.12	-7.36
11,525.00	5.04	284.70	11,514.38	-150.23	181.67	-143.87	1.46	-1.40	4.64
11,550.00	4.76	287.55	11,539.29	-149.64	179.61	-143.35	1.48	-1.12	11.40
11,575.00	4.56	286.10	11,564.21	-149.05	177.67	-142.83	0.93	-0.80	-5.80
11,600.00	4.58	287.99	11,589.13	-148.47	175.77	-142.31	0.61	0.08	7.56
11,625.00	4.58	294.65	11,614.05	-147.75	173.91	-141.65	2.13	0.00	26.64
11,648.00	4.43	291.32	11,636.98	-147.04	172.25	-141.00	1.31	-0.65	-14.48
Tie In									
11,783.00	3.93	288.25	11,771.62	-143.70	163.00	-137.98	0.41	-0.37	-2.27
First Phoenix MWD Survey									
11,846.00	3.47	291.41	11,834.49	-142.32	159.17	-136.74	0.80	-0.73	5.02
11,877.00	3.22	290.47	11,865.44	-141.68	157.48	-136.15	0.83	-0.81	-3.03
11,909.00	3.21	328.21	11,897.39	-140.60	156.17	-135.12	6.50	-0.03	117.94
11,941.00	7.33	357.49	11,929.25	-137.80	155.61	-132.34	14.98	12.88	91.50
11,973.00	12.99	359.86	11,960.74	-132.16	155.51	-126.71	17.73	17.69	7.41
12,004.00	17.82	4.23	11,990.62	-123.94	155.85	-118.48	16.01	15.58	14.10
12,036.00	20.25	7.37	12,020.86	-113.56	156.92	-108.07	8.24	7.59	9.81
12,068.00	21.89	8.86	12,050.72	-102.17	158.55	-96.63	5.39	5.13	4.66
12,100.00	25.40	9.49	12,080.03	-89.51	160.60	-83.90	11.00	10.97	1.97
12,131.00	29.56	12.04	12,107.53	-75.46	163.30	-69.78	13.94	13.42	8.23
12,163.00	33.02	16.73	12,134.88	-59.39	167.45	-53.57	13.22	10.81	14.66
12,195.00	34.90	18.05	12,161.42	-42.33	172.80	-36.34	6.31	5.88	4.13
12,227.00	36.21	17.86	12,187.45	-24.63	178.54	-18.45	4.11	4.09	-0.59
12,259.00	37.30	16.98	12,213.09	-6.36	184.27	0.01	3.78	3.41	-2.75
12,291.00	38.99	16.52	12,238.25	12.57	189.96	19.12	5.36	5.28	-1.44
12,322.00	40.48	16.88	12,262.09	31.55	195.66	38.29	4.86	4.81	1.16
12,354.00	42.40	17.39	12,286.08	51.78	201.90	58.73	6.09	6.00	1.59
FTP: 12354' MD									
12,386.00	43.99	17.49	12,309.41	72.68	208.46	79.84	4.97	4.97	0.31
12,417.00	44.61	17.46	12,331.59	93.33	214.96	100.70	2.00	2.00	-0.10



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Fez Federal Com
Well: 701H
Wellbore: OH / 64018
Design: Surveys (McVay 8)

Local Co-ordinate Reference: Well 701H
TVD Reference: RKB @ 3269.60usft (McVay 8)
MD Reference: RKB @ 3269.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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)
12,448.00	46.60	17.63	12,353.28	114.45	221.64	122.04	6.43	6.42	0.55
12,479.00	49.71	18.17	12,373.96	136.42	228.74	144.24	10.12	10.03	1.74
12,510.00	52.69	17.96	12,393.38	159.39	236.23	167.45	9.63	9.61	-0.68
12,542.00	55.79	18.39	12,412.08	184.06	244.33	192.39	9.75	9.69	1.34
12,574.00	59.48	17.72	12,429.21	209.75	252.70	218.36	11.67	11.53	-2.09
12,606.00	62.17	16.93	12,444.81	236.42	261.02	245.30	8.68	8.41	-2.47
12,638.00	63.98	16.51	12,459.30	263.74	269.23	272.89	5.78	5.66	-1.31
12,670.00	64.66	16.18	12,473.16	291.42	277.34	300.83	2.32	2.13	-1.03
12,702.00	67.93	15.90	12,486.03	319.57	285.44	329.24	10.25	10.22	-0.88
12,733.00	73.06	15.56	12,496.37	347.69	293.36	357.62	16.58	16.55	-1.10
12,765.00	79.26	15.51	12,504.02	377.61	301.67	387.81	19.38	19.38	-0.16
12,797.00	82.62	15.54	12,509.06	408.06	310.13	418.53	10.50	10.50	0.09
12,829.00	85.24	14.86	12,512.45	438.76	318.47	449.50	8.46	8.19	-2.13
12,918.00	90.20	10.01	12,515.99	525.55	337.60	536.90	7.79	5.57	-5.45
13,013.00	89.52	8.64	12,516.22	619.29	353.00	631.12	1.61	-0.72	-1.44
13,108.00	89.72	7.76	12,516.85	713.32	366.54	725.56	0.95	0.21	-0.93
13,204.00	89.47	5.53	12,517.53	808.67	377.65	821.23	2.34	-0.26	-2.32
13,298.00	91.34	5.05	12,516.86	902.26	386.32	915.07	2.05	1.99	-0.51
13,393.00	91.26	4.80	12,514.71	996.88	394.47	1,009.92	0.28	-0.08	-0.26
13,489.00	92.16	5.01	12,511.84	1,092.49	402.68	1,105.75	0.96	0.94	0.22
13,584.00	90.73	3.46	12,509.45	1,187.19	409.69	1,200.64	2.22	-1.51	-1.63
13,680.00	89.55	1.11	12,509.21	1,283.11	413.52	1,296.63	2.74	-1.23	-2.45
13,775.00	90.67	359.34	12,509.03	1,378.10	413.89	1,391.58	2.20	1.18	-1.86
13,870.00	90.98	359.25	12,507.66	1,473.09	412.72	1,486.47	0.34	0.33	-0.09
13,965.00	90.14	358.91	12,506.73	1,568.07	411.20	1,581.34	0.95	-0.88	-0.36
14,060.00	90.00	358.27	12,506.62	1,663.04	408.86	1,676.17	0.69	-0.15	-0.67
14,156.00	89.69	358.32	12,506.88	1,759.00	406.00	1,771.97	0.33	-0.32	0.05
14,251.00	89.97	358.97	12,507.16	1,853.97	403.76	1,866.81	0.74	0.29	0.68
14,347.00	92.07	359.21	12,505.45	1,949.93	402.23	1,962.67	2.20	2.19	0.25
14,442.00	91.18	358.53	12,502.76	2,044.88	400.36	2,057.49	1.18	-0.94	-0.72
14,537.00	91.60	358.59	12,500.45	2,139.82	397.97	2,152.29	0.45	0.44	0.06
14,632.00	92.35	359.40	12,497.18	2,234.75	396.31	2,247.10	1.16	0.79	0.85
14,726.00	92.07	359.30	12,493.55	2,328.67	395.24	2,340.94	0.32	-0.30	-0.11
14,822.00	91.29	358.67	12,490.74	2,424.61	393.54	2,436.76	1.04	-0.81	-0.66
14,917.00	92.66	359.86	12,487.47	2,519.54	392.32	2,531.59	1.91	1.44	1.25
15,013.00	93.98	0.64	12,481.91	2,615.38	392.74	2,627.39	1.60	1.38	0.81
15,108.00	92.44	0.39	12,476.59	2,710.22	393.59	2,722.20	1.64	-1.62	-0.26
15,204.00	92.94	1.01	12,472.08	2,806.11	394.76	2,818.07	0.83	0.52	0.65
15,298.00	90.98	1.66	12,468.87	2,900.02	396.95	2,912.01	2.20	-2.09	0.69
15,394.00	88.57	1.71	12,469.24	2,995.97	399.78	3,008.00	2.51	-2.51	0.05
15,489.00	88.63	1.74	12,471.56	3,090.90	402.63	3,102.97	0.07	0.06	0.03
15,585.00	88.88	1.21	12,473.65	3,186.85	405.10	3,198.94	0.61	0.26	-0.55
15,680.00	89.08	0.78	12,475.34	3,281.82	406.75	3,293.91	0.50	0.21	-0.45



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Fez Federal Com
Well: 701H
Wellbore: OH / 64018
Design: Surveys (McVay 8)

Local Co-ordinate Reference: Well 701H
TVD Reference: RKB @ 3269.60usft (McVay 8)
MD Reference: RKB @ 3269.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,775.00	88.74	0.23	12,477.15	3,376.80	407.59	3,388.86	0.68	-0.36	-0.58
15,871.00	89.50	359.92	12,478.62	3,472.79	407.72	3,484.80	0.85	0.79	-0.32
15,966.00	89.66	358.67	12,479.32	3,567.77	406.55	3,579.69	1.33	0.17	-1.32
16,061.00	89.16	358.32	12,480.30	3,662.74	404.05	3,674.51	0.64	-0.53	-0.37
16,156.00	88.96	358.42	12,481.86	3,757.68	401.35	3,769.31	0.24	-0.21	0.11
16,251.00	92.27	358.06	12,480.84	3,852.62	398.43	3,864.09	3.50	3.48	-0.38
16,346.00	91.51	358.02	12,477.70	3,947.51	395.19	3,958.81	0.80	-0.80	-0.04
16,442.00	90.76	358.49	12,475.80	4,043.45	392.26	4,054.59	0.92	-0.78	0.49
16,537.00	90.64	357.70	12,474.64	4,138.39	389.11	4,149.36	0.84	-0.13	-0.83
16,632.00	89.02	356.98	12,474.92	4,233.28	384.70	4,244.05	1.87	-1.71	-0.76
16,728.00	90.25	357.21	12,475.53	4,329.15	379.83	4,339.69	1.30	1.28	0.24
16,822.00	93.11	359.45	12,472.78	4,423.06	377.09	4,433.45	3.86	3.04	2.38
16,917.00	94.34	0.33	12,466.61	4,517.85	376.91	4,528.18	1.59	1.29	0.93
17,013.00	93.05	0.67	12,460.42	4,613.65	377.75	4,623.95	1.39	-1.34	0.35
17,108.00	91.34	0.74	12,456.78	4,708.57	378.92	4,718.85	1.80	-1.80	0.07
17,202.00	90.56	1.27	12,455.22	4,802.54	380.56	4,812.82	1.00	-0.83	0.56
17,297.00	89.24	1.53	12,455.39	4,897.51	382.88	4,907.81	1.42	-1.39	0.27
17,391.00	88.94	1.43	12,456.88	4,991.47	385.31	5,001.80	0.34	-0.32	-0.11
17,486.00	88.57	1.44	12,458.95	5,086.41	387.69	5,096.77	0.39	-0.39	0.01
17,580.00	87.73	0.74	12,461.98	5,180.35	389.48	5,190.71	1.16	-0.89	-0.74
17,675.00	89.52	359.72	12,464.26	5,275.31	389.86	5,285.63	2.17	1.88	-1.07
17,769.00	91.09	359.31	12,463.76	5,369.31	389.06	5,379.54	1.73	1.67	-0.44
17,863.00	91.65	359.43	12,461.51	5,463.27	388.03	5,473.42	0.61	0.60	0.13
17,958.00	89.55	359.29	12,460.52	5,558.26	386.97	5,568.31	2.22	-2.21	-0.15
18,062.00	89.72	359.49	12,461.18	5,662.25	385.86	5,672.20	0.25	0.16	0.19
18,156.00	88.82	359.53	12,462.38	5,756.24	385.06	5,766.10	0.96	-0.96	0.04
18,251.00	88.38	358.93	12,464.70	5,851.20	383.78	5,860.96	0.78	-0.46	-0.63
18,345.00	90.14	359.83	12,465.91	5,945.18	382.76	5,954.86	2.10	1.87	0.96
18,438.00	90.39	1.37	12,465.48	6,038.17	383.74	6,047.82	1.68	0.27	1.66
18,531.00	90.45	2.02	12,464.80	6,131.13	386.49	6,140.82	0.70	0.06	0.70
18,625.00	89.36	1.30	12,464.96	6,225.09	389.21	6,234.82	1.39	-1.16	-0.77
18,721.00	90.00	0.41	12,465.49	6,321.07	390.64	6,330.80	1.14	0.67	-0.93
18,814.00	90.08	0.39	12,465.43	6,414.07	391.29	6,423.76	0.09	0.09	-0.02
18,910.00	90.00	0.77	12,465.36	6,510.06	392.27	6,519.73	0.40	-0.08	0.40
19,005.00	89.36	0.25	12,465.89	6,605.06	393.11	6,614.70	0.87	-0.67	-0.55
19,100.00	87.28	359.96	12,468.68	6,700.01	393.29	6,709.60	2.21	-2.19	-0.31
19,194.00	86.47	359.10	12,473.80	6,793.87	392.52	6,803.37	1.26	-0.86	-0.91
19,288.00	86.41	359.57	12,479.64	6,887.68	391.43	6,897.09	0.50	-0.06	0.50
19,383.00	86.05	359.26	12,485.88	6,982.47	390.46	6,991.79	0.50	-0.38	-0.33
19,478.00	86.86	358.70	12,491.76	7,077.27	388.77	7,086.48	1.04	0.85	-0.59
19,572.00	87.51	357.84	12,496.37	7,171.11	385.94	7,180.17	1.15	0.69	-0.91
19,666.00	87.56	357.03	12,500.42	7,264.93	381.73	7,273.78	0.86	0.05	-0.86
19,762.00	89.22	356.61	12,503.11	7,360.74	376.41	7,369.35	1.78	1.73	-0.44



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Fez Federal Com
Well: 701H
Wellbore: OH / 64018
Design: Surveys (McVay 8)

Local Co-ordinate Reference: Well 701H
TVD Reference: RKB @ 3269.60usft (McVay 8)
MD Reference: RKB @ 3269.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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)
19,856.00	88.91	357.09	12,504.65	7,454.59	371.25	7,462.96	0.61	-0.33	0.51
19,952.00	88.21	357.06	12,507.06	7,550.43	366.35	7,558.58	0.73	-0.73	-0.03
20,046.00	88.66	357.80	12,509.63	7,644.30	362.14	7,652.25	0.92	0.48	0.79
20,141.00	88.40	358.20	12,512.07	7,739.21	358.82	7,746.99	0.50	-0.27	0.42
20,236.00	87.84	358.20	12,515.18	7,834.11	355.84	7,841.73	0.59	-0.59	0.00
20,331.00	89.22	358.40	12,517.62	7,929.04	353.02	7,936.50	1.47	1.45	0.21
20,426.00	90.11	358.01	12,518.17	8,023.99	350.05	8,031.29	1.02	0.94	-0.41
20,520.00	90.95	357.91	12,517.30	8,117.92	346.70	8,125.06	0.90	0.89	-0.11
20,615.00	91.57	359.64	12,515.22	8,212.88	344.67	8,219.88	1.93	0.65	1.82
20,710.00	90.81	359.38	12,513.24	8,307.85	343.86	8,314.77	0.85	-0.80	-0.27
20,805.00	89.72	359.25	12,512.80	8,402.84	342.72	8,409.67	1.16	-1.15	-0.14
20,899.00	91.60	0.29	12,511.72	8,496.83	342.34	8,503.58	2.29	2.00	1.11
20,995.00	91.68	0.01	12,508.97	8,592.79	342.60	8,599.50	0.30	0.08	-0.29
21,091.00	91.32	0.94	12,506.46	8,688.75	343.39	8,695.43	1.04	-0.38	0.97
21,185.00	89.94	1.36	12,505.43	8,782.72	345.28	8,789.41	1.53	-1.47	0.45
21,281.00	88.80	1.39	12,506.48	8,878.69	347.58	8,885.40	1.19	-1.19	0.03
21,376.00	88.74	1.06	12,508.52	8,973.65	349.61	8,980.37	0.35	-0.06	-0.35
21,471.00	89.24	0.61	12,510.20	9,068.62	351.00	9,075.33	0.71	0.53	-0.47
21,567.00	89.58	0.08	12,511.18	9,164.61	351.57	9,171.29	0.66	0.35	-0.55
21,662.00	89.10	359.99	12,512.28	9,259.61	351.63	9,266.23	0.51	-0.51	-0.09
21,758.00	89.27	359.42	12,513.64	9,355.59	351.14	9,362.14	0.62	0.18	-0.59
21,853.00	89.69	359.70	12,514.51	9,450.59	350.41	9,457.05	0.53	0.44	0.29
21,947.00	89.72	359.48	12,514.99	9,544.58	349.74	9,550.97	0.24	0.03	-0.23
22,042.00	90.36	359.15	12,514.92	9,639.58	348.60	9,645.87	0.76	0.67	-0.35
22,136.00	91.12	359.12	12,513.71	9,733.56	347.18	9,739.74	0.81	0.81	-0.03
22,230.00	90.42	358.68	12,512.45	9,827.53	345.38	9,833.60	0.88	-0.74	-0.47
22,324.00	89.58	358.39	12,512.45	9,921.50	342.97	9,927.43	0.95	-0.89	-0.31
22,379.00	89.74	358.35	12,512.77	9,976.48	341.41	9,982.32	0.31	0.30	-0.07
LTP: 22379' MD									
22,418.00	89.86	358.32	12,512.91	10,015.46	340.27	10,021.24	0.31	0.30	-0.07
Final Phoenix MWD Survey									
22,481.00	89.86	358.32	12,513.06	10,078.43	338.43	10,084.11	0.00	0.00	0.00
Projection to TD									



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 701H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3269.60usft (McVay 8)
Site:	Fez Federal Com	MD Reference:	RKB @ 3269.60usft (McVay 8)
Well:	701H	North Reference:	Grid
Wellbore:	OH / 64018	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
11,648.00	11,636.98	-147.04	172.25	Tie In
11,783.00	11,771.62	-143.70	163.00	First Phoenix MWD Survey
12,354.00	12,286.08	51.78	201.90	FTP: 12354' MD
22,379.00	12,512.77	9,976.48	341.41	LTP: 22379' MD
22,418.00	12,512.91	10,015.46	340.27	Final Phoenix MWD Survey
22,481.00	12,513.06	10,078.43	338.43	Projection to TD