



PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

**Lea County, NM (NAD27 NME)
Huckleberry State Com
504H**

OH/64546

Design: Surveys (McVay 8)

Standard Survey Report

14 May, 2019

HOBBS OCD
DEC 16 2019
RECEIVED





Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	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	Huckleberry State Com				
Site Position:		Northing:	530,679.80 usft	Latitude:	32° 27' 23.5760 N
From:	Map	Easting:	739,901.70 usft	Longitude:	103° 33' 20.0715 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.42 °

Well	504H				
Well Position	+N/-S	0.00 usft	Northing:	530,672.90 usft	Latitude: 32° 27' 23.6047 N
	+E/-W	0.00 usft	Easting:	738,552.80 usft	Longitude: 103° 33' 35.8140 W
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level: 3,741.60 usft

Wellbore	OH/64546				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	3/31/2019	6.67	60.27	48,120.00012975

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	357.80	

Survey Program	Date 5/14/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	10,223.00	SDI Gyros (OH/64546)	Scientific Keeper	Scientific Drilling Intl. Standard Wireline Keeper
10,312.00	21,305.00	Phoenix MWD Surveys (OH/64546)	MWD+HRGM	OWSG MWD + HRGM

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	0.15	32.67	100.00	0.11	0.07	0.11	0.15	0.15	0.00
125.00	0.12	28.59	125.00	0.16	0.10	0.16	0.13	-0.12	-16.32
150.00	0.12	133.51	150.00	0.17	0.13	0.16	0.76	0.00	419.68
175.00	0.24	186.55	175.00	0.10	0.15	0.09	0.77	0.48	212.16
200.00	0.18	196.43	200.00	0.01	0.13	0.00	0.28	-0.24	39.52
225.00	0.28	198.74	225.00	-0.09	0.10	-0.09	0.40	0.40	9.24
250.00	0.33	201.50	250.00	-0.21	0.05	-0.22	0.21	0.20	11.04
275.00	0.36	199.50	275.00	-0.36	0.00	-0.36	0.13	0.12	-8.00
300.00	0.34	203.09	300.00	-0.50	-0.06	-0.50	0.12	-0.08	14.36

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
325.00	0.38	199.36	325.00	-0.64	-0.11	-0.64	0.19	0.16	-14.92
350.00	0.43	196.96	350.00	-0.81	-0.17	-0.81	0.21	0.20	-9.60
375.00	0.41	204.91	375.00	-0.98	-0.23	-0.97	0.25	-0.08	31.80
400.00	0.45	200.18	400.00	-1.16	-0.30	-1.14	0.21	0.16	-18.92
425.00	0.40	200.42	424.99	-1.33	-0.37	-1.31	0.20	-0.20	0.96
450.00	0.52	199.28	449.99	-1.52	-0.44	-1.50	0.48	0.48	-4.56
475.00	0.51	200.63	474.99	-1.73	-0.51	-1.71	0.06	-0.04	5.40
500.00	0.64	202.98	499.99	-1.96	-0.61	-1.94	0.53	0.52	9.40
525.00	0.84	214.22	524.99	-2.24	-0.76	-2.21	0.98	0.80	44.96
550.00	1.56	221.68	549.98	-2.65	-1.09	-2.60	2.94	2.88	29.84
575.00	2.18	223.00	574.97	-3.25	-1.64	-3.18	2.49	2.48	5.28
600.00	2.32	221.28	599.95	-3.98	-2.30	-3.89	0.62	0.56	-6.88
625.00	2.38	223.69	624.93	-4.73	-2.99	-4.62	0.46	0.24	9.64
650.00	2.30	224.02	649.91	-5.47	-3.70	-5.32	0.32	-0.32	1.32
675.00	1.52	225.73	674.90	-6.06	-4.29	-5.89	3.13	-3.12	6.84
700.00	1.04	227.68	699.89	-6.45	-4.69	-6.26	1.93	-1.92	7.80
725.00	0.75	231.71	724.89	-6.70	-4.99	-6.50	1.19	-1.16	16.12
750.00	0.50	247.91	749.88	-6.84	-5.22	-6.64	1.22	-1.00	64.80
775.00	0.19	241.04	774.88	-6.90	-5.36	-6.69	1.25	-1.24	-27.48
800.00	0.35	298.59	799.88	-6.89	-5.46	-6.67	1.18	0.64	230.20
825.00	0.42	311.41	824.88	-6.79	-5.60	-6.57	0.44	0.28	51.28
850.00	0.45	317.05	849.88	-6.66	-5.73	-6.43	0.21	0.12	22.56
875.00	0.38	338.94	874.88	-6.51	-5.83	-6.28	0.69	-0.28	87.56
900.00	0.54	317.47	899.88	-6.34	-5.94	-6.11	0.93	0.64	-85.88
925.00	0.52	327.93	924.88	-6.16	-6.08	-5.92	0.39	-0.08	41.84
950.00	0.47	323.80	949.88	-5.98	-6.20	-5.74	0.25	-0.20	-16.52
975.00	0.62	325.51	974.88	-5.79	-6.33	-5.54	0.60	0.60	6.84
1,000.00	0.79	327.49	999.88	-5.53	-6.50	-5.28	0.69	0.68	7.92
1,025.00	0.93	328.21	1,024.87	-5.21	-6.70	-4.95	0.56	0.56	2.88
1,050.00	0.95	329.99	1,049.87	-4.86	-6.91	-4.59	0.14	0.08	7.12
1,075.00	0.96	330.16	1,074.87	-4.50	-7.12	-4.22	0.04	0.04	0.68
1,100.00	1.07	330.73	1,099.86	-4.12	-7.34	-3.83	0.44	0.44	2.28
1,125.00	1.20	329.29	1,124.86	-3.69	-7.59	-3.39	0.53	0.52	-5.76
1,150.00	1.26	329.03	1,149.85	-3.23	-7.86	-2.92	0.24	0.24	-1.04
1,175.00	1.25	329.85	1,174.85	-2.75	-8.14	-2.44	0.08	-0.04	3.28
1,200.00	1.27	329.28	1,199.84	-2.28	-8.42	-1.96	0.09	0.08	-2.28
1,225.00	1.18	330.83	1,224.83	-1.82	-8.69	-1.48	0.38	-0.36	6.20
1,250.00	1.19	330.09	1,249.83	-1.37	-8.94	-1.02	0.07	0.04	-2.96
1,275.00	1.19	331.79	1,274.82	-0.91	-9.19	-0.56	0.14	0.00	6.80
1,300.00	1.19	330.76	1,299.82	-0.46	-9.44	-0.10	0.09	0.00	-4.12
1,325.00	1.20	329.20	1,324.81	-0.01	-9.70	0.37	0.14	0.04	-6.24
1,350.00	1.17	327.36	1,349.81	0.43	-9.98	0.82	0.19	-0.12	-7.36
1,375.00	1.16	322.39	1,374.80	0.85	-10.27	1.24	0.41	-0.04	-19.88

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	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)
1,400.00	1.14	322.69	1,399.80	1.25	-10.57	1.65	0.08	-0.08	1.20
1,425.00	1.19	320.42	1,424.79	1.64	-10.89	2.06	0.27	0.20	-9.08
1,450.00	1.26	318.35	1,449.79	2.05	-11.24	2.48	0.33	0.28	-8.28
1,475.00	1.27	318.94	1,474.78	2.46	-11.60	2.91	0.07	0.04	2.36
1,500.00	1.34	314.63	1,499.77	2.88	-11.99	3.34	0.48	0.28	-17.24
1,525.00	1.38	313.83	1,524.77	3.29	-12.42	3.77	0.18	0.16	-3.20
1,550.00	1.56	312.89	1,549.76	3.73	-12.88	4.22	0.73	0.72	-3.76
1,575.00	1.74	309.62	1,574.75	4.21	-13.43	4.72	0.81	0.72	-13.08
1,600.00	1.78	308.33	1,599.74	4.69	-14.02	5.22	0.23	0.16	-5.16
1,625.00	1.76	308.05	1,624.72	5.17	-14.63	5.72	0.09	-0.08	-1.12
1,650.00	1.77	308.42	1,649.71	5.64	-15.23	6.22	0.06	0.04	1.48
1,675.00	1.77	308.00	1,674.70	6.12	-15.84	6.72	0.05	0.00	-1.68
1,700.00	1.77	307.25	1,699.69	6.59	-16.45	7.22	0.09	0.00	-3.00
1,725.00	1.82	308.64	1,724.68	7.07	-17.07	7.72	0.27	0.20	5.56
1,750.00	1.87	309.16	1,749.66	7.58	-17.70	8.25	0.21	0.20	2.08
1,775.00	1.81	308.97	1,774.65	8.08	-18.32	8.78	0.24	-0.24	-0.76
1,800.00	1.85	310.39	1,799.64	8.59	-18.93	9.32	0.24	0.16	5.68
1,825.00	1.85	312.83	1,824.62	9.13	-19.54	9.87	0.32	0.00	9.76
1,850.00	1.89	313.24	1,849.61	9.69	-20.13	10.45	0.17	0.16	1.64
1,875.00	1.86	313.24	1,874.60	10.25	-20.73	11.04	0.12	-0.12	0.00
1,900.00	1.88	314.63	1,899.58	10.81	-21.32	11.62	0.20	0.08	5.56
1,925.00	1.85	315.31	1,924.57	11.39	-21.89	12.22	0.15	-0.12	2.72
1,950.00	1.96	315.41	1,949.56	11.98	-22.48	12.83	0.44	0.44	0.40
1,975.00	1.93	313.93	1,974.54	12.58	-23.08	13.45	0.23	-0.12	-5.92
2,000.00	2.05	302.42	1,999.53	13.11	-23.76	14.01	1.67	0.48	-46.04
2,025.00	2.14	298.20	2,024.51	13.57	-24.55	14.50	0.71	0.36	-16.88
2,050.00	2.19	294.85	2,049.49	13.99	-25.39	14.96	0.54	0.20	-13.40
2,075.00	2.25	290.95	2,074.47	14.37	-26.29	15.37	0.65	0.24	-15.60
2,100.00	2.57	278.83	2,099.45	14.63	-27.30	15.67	2.40	1.28	-48.48
2,125.00	2.43	278.77	2,124.43	14.79	-28.38	15.87	0.56	-0.56	-0.24
2,150.00	2.59	270.05	2,149.41	14.87	-29.46	16.00	1.65	0.64	-34.88
2,175.00	2.81	260.21	2,174.38	14.77	-30.63	15.94	2.05	0.88	-39.36
2,200.00	3.22	254.17	2,199.34	14.48	-31.91	15.69	2.07	1.64	-24.16
2,225.00	3.45	251.45	2,224.30	14.04	-33.30	15.31	1.12	0.92	-10.88
2,250.00	3.72	248.59	2,249.25	13.51	-34.77	14.84	1.30	1.08	-11.44
2,275.00	3.77	249.60	2,274.20	12.93	-36.29	14.31	0.33	0.20	4.04
2,300.00	3.96	249.24	2,299.14	12.33	-37.87	13.78	0.77	0.76	-1.44
2,325.00	4.22	248.56	2,324.08	11.69	-39.54	13.20	1.06	1.04	-2.72
2,350.00	4.52	247.39	2,349.00	10.98	-41.30	12.56	1.25	1.20	-4.68
2,375.00	4.65	248.99	2,373.92	10.24	-43.16	11.89	0.73	0.52	6.40
2,400.00	4.89	248.87	2,398.84	9.49	-45.10	11.21	0.96	0.96	-0.48
2,425.00	5.12	248.42	2,423.74	8.69	-47.13	10.50	0.93	0.92	-1.80
2,450.00	5.24	248.20	2,448.64	7.86	-49.23	9.75	0.49	0.48	-0.88

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	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)
2,475.00	5.54	248.59	2,473.53	6.99	-51.41	8.97	1.21	1.20	1.56
2,500.00	5.80	248.88	2,498.41	6.10	-53.71	8.16	1.05	1.04	1.16
2,525.00	6.03	248.78	2,523.27	5.17	-56.11	7.32	0.92	0.92	-0.40
2,550.00	6.19	248.94	2,548.13	4.21	-58.59	6.46	0.64	0.64	0.64
2,575.00	6.20	249.05	2,572.99	3.24	-61.11	5.59	0.06	0.04	0.44
2,600.00	6.21	249.13	2,597.84	2.28	-63.64	4.72	0.05	0.04	0.32
2,625.00	5.90	249.40	2,622.70	1.34	-66.10	3.88	1.25	-1.24	1.08
2,650.00	5.52	248.98	2,647.58	0.46	-68.43	3.09	1.53	-1.52	-1.68
2,675.00	5.32	247.35	2,672.47	-0.42	-70.62	2.30	1.01	-0.80	-6.52
2,700.00	5.40	246.97	2,697.36	-1.32	-72.77	1.48	0.35	0.32	-1.52
2,725.00	5.31	248.05	2,722.25	-2.22	-74.93	0.67	0.54	-0.36	4.32
2,750.00	5.31	247.30	2,747.14	-3.10	-77.07	-0.13	0.28	0.00	-3.00
2,775.00	5.50	247.92	2,772.03	-3.99	-79.25	-0.94	0.80	0.76	2.48
2,800.00	5.59	246.90	2,796.91	-4.92	-81.48	-1.78	0.53	0.36	-4.08
2,825.00	5.82	247.26	2,821.79	-5.89	-83.77	-2.66	0.93	0.92	1.44
2,850.00	5.79	246.21	2,846.66	-6.89	-86.09	-3.57	0.44	-0.12	-4.20
2,875.00	5.54	247.11	2,871.54	-7.86	-88.35	-4.46	1.06	-1.00	3.60
2,900.00	5.20	248.05	2,896.43	-8.76	-90.52	-5.27	1.40	-1.36	3.76
2,925.00	4.86	247.22	2,921.33	-9.59	-92.54	-6.02	1.39	-1.36	-3.32
2,950.00	4.57	248.76	2,946.25	-10.36	-94.45	-6.72	1.27	-1.16	6.16
2,975.00	4.52	249.65	2,971.17	-11.07	-96.30	-7.35	0.35	-0.20	3.56
3,000.00	4.54	250.98	2,996.09	-11.73	-98.16	-7.95	0.43	0.08	5.32
3,025.00	4.55	249.76	3,021.01	-12.40	-100.02	-8.54	0.39	0.04	-4.88
3,050.00	4.73	247.12	3,045.93	-13.14	-101.91	-9.21	1.12	0.72	-10.56
3,075.00	4.51	249.29	3,070.85	-13.89	-103.77	-9.89	1.12	-0.88	8.68
3,100.00	4.52	249.91	3,095.77	-14.57	-105.62	-10.50	0.20	0.04	2.48
3,125.00	4.64	250.53	3,120.69	-15.25	-107.50	-11.10	0.52	0.48	2.48
3,150.00	4.89	248.82	3,145.60	-15.97	-109.44	-11.75	1.15	1.00	-6.84
3,175.00	5.05	247.21	3,170.51	-16.78	-111.45	-12.48	0.85	0.64	-6.44
3,200.00	5.30	246.46	3,195.41	-17.67	-113.52	-13.29	1.04	1.00	-3.00
3,225.00	5.25	246.66	3,220.30	-18.58	-115.63	-14.12	0.21	-0.20	0.80
3,250.00	5.28	245.88	3,245.20	-19.51	-117.73	-14.97	0.31	0.12	-3.12
3,275.00	5.41	246.86	3,270.09	-20.44	-119.87	-15.82	0.64	0.52	3.92
3,300.00	5.44	246.50	3,294.98	-21.38	-122.04	-16.67	0.18	0.12	-1.44
3,325.00	5.52	245.65	3,319.86	-22.34	-124.22	-17.55	0.46	0.32	-3.40
3,350.00	5.72	245.77	3,344.74	-23.35	-126.45	-18.47	0.80	0.80	0.48
3,375.00	5.77	245.68	3,369.62	-24.38	-128.73	-19.41	0.20	0.20	-0.36
3,400.00	5.85	246.30	3,394.49	-25.41	-131.04	-20.35	0.41	0.32	2.48
3,425.00	5.80	245.41	3,419.36	-26.45	-133.36	-21.30	0.41	-0.20	-3.56
3,450.00	5.85	246.07	3,444.23	-27.49	-135.67	-22.25	0.33	0.20	2.64
3,475.00	5.37	242.73	3,469.11	-28.54	-137.88	-23.22	2.32	-1.92	-13.36
3,500.00	5.20	238.81	3,494.00	-29.67	-139.89	-24.26	1.60	-0.68	-15.68
3,525.00	5.18	238.22	3,518.90	-30.85	-141.81	-25.37	0.23	-0.08	-2.36
3,550.00	5.23	239.42	3,543.80	-32.02	-143.76	-26.47	0.48	0.20	4.80

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	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)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
3,575.00	5.50	236.38	3,568.69	-33.26	-145.73	-27.63	1.57	1.08	-12.16
3,600.00	5.40	235.77	3,593.58	-34.59	-147.70	-28.88	0.46	-0.40	-2.44
3,625.00	5.41	235.24	3,618.46	-35.92	-149.64	-30.14	0.20	0.04	-2.12
3,650.00	5.49	233.70	3,643.35	-37.30	-151.58	-31.45	0.67	0.32	-6.16
3,675.00	4.71	237.84	3,668.25	-38.56	-153.41	-32.63	3.45	-3.12	16.56
3,700.00	4.44	239.79	3,693.17	-39.59	-155.11	-33.60	1.25	-1.08	7.80
3,725.00	4.31	239.97	3,718.10	-40.55	-156.76	-34.49	0.52	-0.52	0.72
3,750.00	4.27	239.90	3,743.03	-41.48	-158.38	-35.36	0.16	-0.16	-0.28
3,775.00	4.39	239.52	3,767.96	-42.44	-160.01	-36.25	0.49	0.48	-1.52
3,800.00	4.58	240.39	3,792.88	-43.41	-161.71	-37.16	0.81	0.76	3.48
3,825.00	4.90	240.36	3,817.80	-44.44	-163.50	-38.12	1.28	1.28	-0.12
3,850.00	5.05	240.76	3,842.70	-45.50	-165.39	-39.11	0.62	0.60	1.60
3,875.00	5.29	240.24	3,867.60	-46.61	-167.35	-40.14	0.98	0.96	-2.08
3,900.00	6.20	233.94	3,892.47	-47.98	-169.44	-41.43	4.42	3.64	-25.20
3,925.00	5.69	238.71	3,917.34	-49.42	-171.59	-42.78	2.84	-2.04	19.08
3,950.00	5.14	244.28	3,942.23	-50.55	-173.66	-43.83	3.04	-2.20	22.28
3,975.00	4.74	248.96	3,967.14	-51.40	-175.63	-44.61	2.27	-1.60	18.72
4,000.00	4.58	252.58	3,992.05	-52.07	-177.55	-45.21	1.34	-0.64	14.48
4,025.00	4.49	250.51	4,016.98	-52.70	-179.42	-45.76	0.75	-0.36	-8.28
4,050.00	4.58	252.52	4,041.90	-53.32	-181.30	-46.31	0.73	0.36	8.04
4,075.00	4.71	255.35	4,066.81	-53.88	-183.24	-46.80	1.05	0.52	11.32
4,100.00	4.74	256.81	4,091.73	-54.38	-185.24	-47.21	0.50	0.12	5.84
4,125.00	4.62	258.77	4,116.65	-54.81	-187.24	-47.57	0.80	-0.48	7.84
4,150.00	4.56	262.26	4,141.57	-55.14	-189.21	-47.82	1.14	-0.24	13.96
4,175.00	4.62	263.11	4,166.49	-55.39	-191.19	-48.00	0.36	0.24	3.40
4,200.00	4.92	263.22	4,191.40	-55.64	-193.26	-48.17	1.20	1.20	0.44
4,225.00	5.16	263.65	4,216.30	-55.89	-195.44	-48.34	0.97	0.96	1.72
4,250.00	5.68	260.60	4,241.19	-56.22	-197.78	-48.57	2.38	2.08	-12.20
4,275.00	5.80	264.86	4,266.07	-56.53	-200.25	-48.79	1.77	0.48	17.04
4,300.00	5.92	265.86	4,290.94	-56.74	-202.80	-48.90	0.63	0.48	4.00
4,325.00	5.92	268.57	4,315.80	-56.87	-205.37	-48.93	1.12	0.00	10.84
4,350.00	5.84	269.62	4,340.67	-56.91	-207.93	-48.87	0.54	-0.32	4.20
4,375.00	5.60	271.02	4,365.55	-56.89	-210.43	-48.76	1.11	-0.96	5.60
4,400.00	5.63	270.81	4,390.43	-56.85	-212.87	-48.63	0.15	0.12	-0.84
4,425.00	5.34	266.47	4,415.31	-56.91	-215.26	-48.59	2.02	-1.16	-17.36
4,450.00	4.51	263.79	4,440.22	-57.09	-217.40	-48.68	3.44	-3.32	-10.72
4,475.00	3.97	259.76	4,465.15	-57.35	-219.23	-48.87	2.47	-2.16	-16.12
4,500.00	3.70	255.45	4,490.09	-57.70	-220.86	-49.17	1.58	-1.08	-17.24
4,525.00	3.74	255.35	4,515.04	-58.11	-222.43	-49.52	0.16	0.16	-0.40
4,550.00	3.66	253.57	4,539.99	-58.54	-223.98	-49.89	0.56	-0.32	-7.12
4,575.00	3.55	253.29	4,564.94	-58.99	-225.49	-50.28	0.45	-0.44	-1.12
4,600.00	3.41	247.84	4,589.89	-59.50	-226.92	-50.72	1.44	-0.56	-21.80
4,625.00	3.33	242.77	4,614.85	-60.11	-228.25	-51.29	1.23	-0.32	-20.28

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,650.00	3.33	240.75	4,639.81	-60.80	-229.53	-51.92	0.47	0.00	-8.08
4,675.00	3.33	238.79	4,664.77	-61.53	-230.79	-52.61	0.46	0.00	-7.84
4,700.00	3.34	238.89	4,689.72	-62.28	-232.03	-53.31	0.05	0.04	0.40
4,725.00	3.38	238.03	4,714.68	-63.05	-233.28	-54.03	0.26	0.16	-3.44
4,750.00	3.31	229.86	4,739.64	-63.90	-234.46	-54.84	1.93	-0.28	-32.68
4,775.00	3.34	231.40	4,764.60	-64.82	-235.58	-55.71	0.38	0.12	6.16
4,800.00	3.42	234.53	4,789.55	-65.71	-236.75	-56.55	0.80	0.32	12.52
4,825.00	3.42	232.83	4,814.51	-66.59	-237.96	-57.39	0.41	0.00	-6.80
4,850.00	3.42	234.71	4,839.46	-67.47	-239.16	-58.22	0.45	0.00	7.52
4,875.00	3.50	234.31	4,864.42	-68.35	-240.39	-59.05	0.33	0.32	-1.60
4,900.00	3.45	231.25	4,889.37	-69.26	-241.59	-59.92	0.77	-0.20	-12.24
4,925.00	3.60	233.35	4,914.33	-70.20	-242.81	-60.81	0.79	0.60	8.40
4,950.00	3.71	232.80	4,939.27	-71.16	-244.08	-61.72	0.46	0.44	-2.20
4,975.00	3.74	232.70	4,964.22	-72.14	-245.38	-62.65	0.12	0.12	-0.40
5,000.00	3.79	233.55	4,989.17	-73.13	-246.69	-63.59	0.30	0.20	3.40
5,025.00	3.74	233.19	5,014.11	-74.11	-248.01	-64.52	0.22	-0.20	-1.44
5,050.00	3.77	233.67	5,039.06	-75.08	-249.32	-65.44	0.17	0.12	1.92
5,075.00	3.86	234.33	5,064.01	-76.06	-250.67	-66.37	0.40	0.36	2.64
5,100.00	3.79	233.63	5,088.95	-77.04	-252.02	-67.29	0.34	-0.28	-2.80
5,125.00	3.88	233.26	5,113.89	-78.04	-253.36	-68.24	0.37	0.36	-1.48
5,150.00	3.82	233.59	5,138.84	-79.04	-254.71	-69.18	0.26	-0.24	1.32
5,175.00	3.84	233.43	5,163.78	-80.03	-256.05	-70.12	0.09	0.08	-0.64
5,200.00	3.83	234.01	5,188.73	-81.02	-257.40	-71.06	0.16	-0.04	2.32
5,225.00	4.01	234.12	5,213.67	-82.02	-258.78	-72.01	0.72	0.72	0.44
5,250.00	3.92	235.71	5,238.61	-83.02	-260.20	-72.95	0.57	-0.36	6.36
5,275.00	3.74	234.61	5,263.55	-83.97	-261.57	-73.85	0.78	-0.72	-4.40
5,300.00	3.63	232.19	5,288.50	-84.93	-262.86	-74.76	0.76	-0.44	-9.68
5,325.00	3.64	233.62	5,313.45	-85.88	-264.12	-75.66	0.36	0.04	5.72
5,350.00	3.60	233.55	5,338.40	-86.82	-265.39	-76.55	0.16	-0.16	-0.28
5,375.00	3.56	233.29	5,363.35	-87.75	-266.65	-77.43	0.17	-0.16	-1.04
5,400.00	3.42	236.92	5,388.30	-88.62	-267.89	-78.25	1.05	-0.56	14.52
5,425.00	3.43	235.40	5,413.26	-89.45	-269.13	-79.04	0.37	0.04	-6.08
5,450.00	3.40	235.94	5,438.22	-90.29	-270.36	-79.83	0.18	-0.12	2.16
5,475.00	3.39	235.23	5,463.17	-91.13	-271.58	-80.62	0.17	-0.04	-2.84
5,500.00	3.36	235.65	5,488.13	-91.97	-272.80	-81.41	0.16	-0.12	1.68
5,525.00	3.36	235.46	5,513.08	-92.79	-274.00	-82.19	0.04	0.00	-0.76
5,550.00	3.40	235.92	5,538.04	-93.63	-275.22	-82.97	0.19	0.16	1.84
5,575.00	3.34	237.08	5,563.00	-94.44	-276.45	-83.74	0.36	-0.24	4.64
5,600.00	3.35	235.10	5,587.96	-95.25	-277.66	-84.50	0.46	0.04	-7.92
5,625.00	3.42	242.45	5,612.91	-96.01	-278.92	-85.22	1.76	0.28	29.40
5,650.00	3.31	231.52	5,637.87	-96.81	-280.14	-85.96	2.60	-0.44	-43.72
5,675.00	3.14	238.61	5,662.83	-97.61	-281.29	-86.72	1.73	-0.68	28.36
5,700.00	2.11	257.80	5,687.80	-98.07	-282.33	-87.14	5.36	-4.12	76.76

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	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	1.66	272.95	5,712.79	-98.15	-283.14	-87.18	2.67	-1.80	60.60
5,750.00	1.67	276.29	5,737.78	-98.09	-283.86	-87.10	0.39	0.04	13.36
5,775.00	1.58	275.84	5,762.77	-98.01	-284.57	-87.00	0.36	-0.36	-1.80
5,800.00	1.37	272.45	5,787.76	-97.96	-285.21	-86.92	0.91	-0.84	-13.56
5,825.00	1.40	271.13	5,812.75	-97.95	-285.81	-86.88	0.18	0.12	-5.28
5,850.00	1.39	273.09	5,837.75	-97.92	-286.42	-86.84	0.20	-0.04	7.84
5,875.00	1.40	274.52	5,862.74	-97.88	-287.03	-86.77	0.14	0.04	5.72
5,900.00	1.43	270.91	5,887.73	-97.85	-287.64	-86.72	0.38	0.12	-14.44
5,925.00	1.34	270.00	5,912.72	-97.85	-288.25	-86.69	0.37	-0.36	-3.64
5,950.00	1.29	269.29	5,937.72	-97.85	-288.82	-86.67	0.21	-0.20	-2.84
5,975.00	1.44	273.00	5,962.71	-97.84	-289.42	-86.64	0.70	0.60	14.84
6,000.00	1.43	271.05	5,987.70	-97.82	-290.04	-86.59	0.20	-0.04	-7.80
6,025.00	1.31	268.81	6,012.70	-97.82	-290.64	-86.57	0.53	-0.48	-8.96
6,050.00	1.37	272.88	6,037.69	-97.81	-291.23	-86.54	0.45	0.24	16.28
6,075.00	1.46	272.32	6,062.68	-97.78	-291.84	-86.48	0.36	0.36	-2.24
6,100.00	1.39	270.45	6,087.67	-97.76	-292.46	-86.44	0.34	-0.28	-7.48
6,125.00	1.39	270.88	6,112.67	-97.76	-293.07	-86.41	0.04	0.00	1.72
6,150.00	1.38	266.61	6,137.66	-97.77	-293.67	-86.40	0.41	-0.04	-17.08
6,175.00	1.37	270.50	6,162.65	-97.79	-294.27	-86.40	0.38	-0.04	15.56
6,200.00	1.46	268.08	6,187.64	-97.79	-294.89	-86.38	0.43	0.36	-9.68
6,225.00	1.41	267.92	6,212.64	-97.82	-295.52	-86.38	0.20	-0.20	-0.64
6,250.00	1.36	268.71	6,237.63	-97.83	-296.12	-86.37	0.21	-0.20	3.16
6,275.00	1.41	271.77	6,262.62	-97.83	-296.72	-86.35	0.36	0.20	12.24
6,300.00	1.48	270.84	6,287.61	-97.82	-297.35	-86.31	0.30	0.28	-3.72
6,325.00	1.42	267.59	6,312.61	-97.83	-297.99	-86.29	0.41	-0.24	-13.00
6,350.00	1.39	270.56	6,337.60	-97.84	-298.60	-86.28	0.31	-0.12	11.88
6,375.00	1.36	269.88	6,362.59	-97.83	-299.20	-86.25	0.14	-0.12	-2.72
6,400.00	1.38	269.87	6,387.58	-97.83	-299.80	-86.23	0.08	0.08	-0.04
6,425.00	1.46	270.19	6,412.58	-97.83	-300.42	-86.21	0.32	0.32	1.28
6,450.00	1.36	269.73	6,437.57	-97.83	-301.03	-86.18	0.40	-0.40	-1.84
6,475.00	1.55	271.43	6,462.56	-97.83	-301.67	-86.15	0.78	0.76	6.80
6,500.00	1.44	266.28	6,487.55	-97.84	-302.32	-86.14	0.69	-0.44	-20.60
6,525.00	1.42	267.57	6,512.54	-97.87	-302.94	-86.15	0.15	-0.08	5.16
6,550.00	1.70	257.71	6,537.53	-97.96	-303.61	-86.22	1.55	1.12	-39.44
6,575.00	1.86	257.35	6,562.52	-98.13	-304.37	-86.35	0.64	0.64	-1.44
6,600.00	1.83	254.53	6,587.51	-98.33	-305.15	-86.52	0.38	-0.12	-11.28
6,625.00	1.86	254.19	6,612.50	-98.54	-305.93	-86.71	0.13	0.12	-1.36
6,650.00	1.84	254.73	6,637.48	-98.76	-306.70	-86.89	0.11	-0.08	2.16
6,675.00	1.79	254.01	6,662.47	-98.97	-307.47	-87.08	0.22	-0.20	-2.88
6,700.00	1.74	255.72	6,687.46	-99.18	-308.21	-87.25	0.29	-0.20	6.84
6,725.00	1.86	257.31	6,712.45	-99.36	-308.97	-87.40	0.52	0.48	6.36
6,750.00	1.82	255.16	6,737.43	-99.55	-309.75	-87.56	0.32	-0.16	-8.60
6,775.00	1.87	253.10	6,762.42	-99.77	-310.53	-87.75	0.33	0.20	-8.24
6,800.00	1.79	256.30	6,787.41	-99.98	-311.30	-87.93	0.52	-0.32	12.80



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Huckleberry State Com
Well: 504H
Wellbore: OH/64546
Design: Surveys (McVay 8)

Local Co-ordinate Reference: Well 504H
TVD Reference: KB=26' @ 3767.60usft (McVay 8)
MD Reference: KB=26' @ 3767.60usft (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	1.86	255.28	6,812.40	-100.18	-312.07	-88.10	0.31	0.28	-4.08
6,850.00	1.82	253.50	6,837.38	-100.39	-312.84	-88.29	0.28	-0.16	-7.12
6,875.00	1.88	255.43	6,862.37	-100.61	-313.62	-88.47	0.35	0.24	7.72
6,900.00	1.88	257.42	6,887.36	-100.80	-314.42	-88.63	0.26	0.00	7.96
6,925.00	1.88	257.10	6,912.34	-100.98	-315.22	-88.78	0.04	0.00	-1.28
6,950.00	1.86	255.24	6,937.33	-101.18	-316.01	-88.95	0.26	-0.08	-7.44
6,975.00	1.77	254.35	6,962.32	-101.38	-316.77	-89.13	0.38	-0.36	-3.56
7,000.00	1.84	255.75	6,987.30	-101.59	-317.53	-89.30	0.33	0.28	5.60
7,025.00	1.71	244.27	7,012.29	-101.85	-318.26	-89.53	1.51	-0.52	-45.92
7,050.00	1.71	243.86	7,037.28	-102.17	-318.93	-89.83	0.05	0.00	-1.64
7,075.00	1.64	238.40	7,062.27	-102.53	-319.57	-90.16	0.70	-0.28	-21.84
7,100.00	1.56	235.90	7,087.26	-102.90	-320.15	-90.51	0.42	-0.32	-10.00
7,125.00	1.67	235.16	7,112.25	-103.30	-320.74	-90.89	0.45	0.44	-2.96
7,150.00	1.62	229.80	7,137.24	-103.74	-321.30	-91.30	0.65	-0.20	-21.44
7,175.00	1.68	233.12	7,162.23	-104.19	-321.87	-91.73	0.45	0.24	13.28
7,200.00	1.67	233.78	7,187.22	-104.62	-322.45	-92.14	0.09	-0.04	2.64
7,225.00	1.66	230.38	7,212.21	-105.07	-323.03	-92.57	0.40	-0.04	-13.60
7,250.00	1.68	229.39	7,237.20	-105.54	-323.58	-93.01	0.14	0.08	-3.96
7,275.00	1.63	232.40	7,262.19	-105.99	-324.14	-93.45	0.40	-0.20	12.04
7,300.00	1.66	233.27	7,287.18	-106.43	-324.72	-93.86	0.16	0.12	3.48
7,325.00	1.70	233.73	7,312.17	-106.86	-325.31	-94.27	0.17	0.16	1.84
7,350.00	1.70	231.96	7,337.16	-107.31	-325.90	-94.70	0.21	0.00	-7.08
7,375.00	1.67	231.34	7,362.15	-107.77	-326.47	-95.13	0.14	-0.12	-2.48
7,400.00	1.74	233.94	7,387.13	-108.22	-327.06	-95.56	0.42	0.28	10.40
7,425.00	1.76	233.20	7,412.12	-108.67	-327.68	-95.99	0.12	0.08	-2.96
7,450.00	1.72	230.66	7,437.11	-109.14	-328.28	-96.43	0.35	-0.16	-10.16
7,475.00	1.70	230.24	7,462.10	-109.61	-328.85	-96.89	0.09	-0.08	-1.68
7,500.00	1.75	232.62	7,487.09	-110.08	-329.44	-97.33	0.35	0.20	9.52
7,525.00	1.68	231.50	7,512.08	-110.54	-330.03	-97.77	0.31	-0.28	-4.48
7,550.00	1.63	228.21	7,537.07	-111.01	-330.58	-98.21	0.43	-0.20	-13.16
7,575.00	1.62	226.21	7,562.06	-111.49	-331.10	-98.67	0.23	-0.04	-8.00
7,600.00	1.57	226.88	7,587.05	-111.97	-331.61	-99.13	0.21	-0.20	2.68
7,625.00	1.62	225.02	7,612.04	-112.45	-332.11	-99.60	0.29	0.20	-7.44
7,650.00	1.53	225.54	7,637.03	-112.93	-332.59	-100.06	0.36	-0.36	2.08
7,675.00	1.59	224.32	7,662.02	-113.42	-333.08	-100.52	0.27	0.24	-4.88
7,700.00	1.58	223.53	7,687.01	-113.91	-333.56	-101.00	0.10	-0.04	-3.16
7,725.00	1.60	224.10	7,712.00	-114.42	-334.04	-101.48	0.10	0.08	2.28
7,750.00	1.57	223.84	7,736.99	-114.91	-334.52	-101.96	0.12	-0.12	-1.04
7,775.00	1.56	225.06	7,761.98	-115.40	-334.99	-102.43	0.14	-0.04	4.88
7,800.00	1.56	223.77	7,786.97	-115.89	-335.47	-102.90	0.14	0.00	-5.16
7,825.00	1.59	223.28	7,811.96	-116.38	-335.94	-103.38	0.13	0.12	-1.96
7,850.00	1.62	222.04	7,836.95	-116.90	-336.42	-103.88	0.18	0.12	-4.96
7,875.00	1.42	221.50	7,861.94	-117.39	-336.86	-104.35	0.80	-0.80	-2.16



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,900.00	1.66	225.08	7,886.93	-117.88	-337.32	-104.82	1.03	0.96	14.32
7,925.00	1.63	223.93	7,911.92	-118.39	-337.82	-105.31	0.18	-0.12	-4.60
7,950.00	1.55	224.06	7,936.91	-118.89	-338.31	-105.79	0.32	-0.32	0.52
7,975.00	1.51	223.41	7,961.91	-119.37	-338.77	-106.26	0.17	-0.16	-2.60
8,000.00	1.43	229.05	7,986.90	-119.82	-339.23	-106.68	0.66	-0.32	22.56
8,025.00	1.46	227.51	8,011.89	-120.24	-339.70	-107.08	0.20	0.12	-6.16
8,050.00	1.47	226.00	8,036.88	-120.68	-340.17	-107.50	0.16	0.04	-6.04
8,075.00	1.47	226.57	8,061.87	-121.12	-340.63	-107.93	0.06	0.00	2.28
8,100.00	1.27	228.66	8,086.87	-121.52	-341.07	-108.32	0.82	-0.80	8.36
8,125.00	1.29	233.83	8,111.86	-121.87	-341.51	-108.65	0.47	0.08	20.68
8,150.00	1.13	245.35	8,136.85	-122.14	-341.96	-108.90	1.16	-0.64	46.08
8,175.00	0.85	257.66	8,161.85	-122.28	-342.36	-109.03	1.40	-1.12	49.24
8,200.00	0.65	279.14	8,186.85	-122.30	-342.68	-109.03	1.37	-0.80	85.92
8,225.00	0.68	284.21	8,211.85	-122.24	-342.97	-108.96	0.26	0.12	20.28
8,250.00	0.73	288.95	8,236.84	-122.15	-343.26	-108.86	0.31	0.20	18.96
8,275.00	0.64	287.08	8,261.84	-122.06	-343.55	-108.76	0.37	-0.36	-7.48
8,300.00	0.58	288.32	8,286.84	-121.98	-343.80	-108.67	0.25	-0.24	4.96
8,325.00	0.70	290.12	8,311.84	-121.89	-344.06	-108.57	0.49	0.48	7.20
8,350.00	0.57	294.78	8,336.84	-121.78	-344.32	-108.45	0.56	-0.52	18.64
8,375.00	0.70	294.63	8,361.84	-121.67	-344.57	-108.33	0.52	0.52	-0.60
8,400.00	0.54	295.28	8,386.84	-121.55	-344.82	-108.20	0.64	-0.64	2.60
8,425.00	0.50	286.12	8,411.83	-121.47	-345.03	-108.11	0.37	-0.16	-36.64
8,450.00	0.53	293.28	8,436.83	-121.40	-345.24	-108.03	0.28	0.12	28.64
8,475.00	0.65	289.64	8,461.83	-121.30	-345.48	-107.93	0.50	0.48	-14.56
8,500.00	0.54	292.66	8,486.83	-121.21	-345.72	-107.82	0.46	-0.44	12.08
8,525.00	0.56	292.83	8,511.83	-121.12	-345.94	-107.72	0.08	0.08	0.68
8,550.00	0.52	292.66	8,536.83	-121.03	-346.16	-107.62	0.16	-0.16	-0.68
8,575.00	0.70	293.55	8,561.83	-120.92	-346.40	-107.51	0.72	0.72	3.56
8,600.00	0.81	261.30	8,586.83	-120.89	-346.72	-107.46	1.73	0.44	-129.00
8,625.00	0.57	283.74	8,611.82	-120.88	-347.01	-107.45	1.43	-0.96	89.76
8,650.00	0.55	282.98	8,636.82	-120.83	-347.25	-107.38	0.09	-0.08	-3.04
8,675.00	0.65	285.73	8,661.82	-120.76	-347.50	-107.31	0.42	0.40	11.00
8,700.00	0.63	279.93	8,686.82	-120.70	-347.78	-107.24	0.27	-0.08	-23.20
8,725.00	0.65	285.71	8,711.82	-120.64	-348.05	-107.16	0.27	0.08	23.12
8,750.00	0.54	282.26	8,736.82	-120.57	-348.30	-107.09	0.46	-0.44	-13.80
8,775.00	0.67	282.25	8,761.81	-120.52	-348.56	-107.02	0.52	0.52	-0.04
8,800.00	0.65	281.24	8,786.81	-120.46	-348.84	-106.96	0.09	-0.08	-4.04
8,825.00	0.58	285.35	8,811.81	-120.40	-349.10	-106.88	0.33	-0.28	16.44
8,850.00	0.76	285.09	8,836.81	-120.32	-349.38	-106.80	0.72	0.72	-1.04
8,875.00	0.63	287.44	8,861.81	-120.24	-349.67	-106.70	0.53	-0.52	9.40
8,900.00	0.71	280.45	8,886.81	-120.17	-349.96	-106.62	0.46	0.32	-27.96
8,925.00	0.79	279.30	8,911.80	-120.11	-350.28	-106.55	0.33	0.32	-4.60
8,950.00	0.81	287.45	8,936.80	-120.03	-350.62	-106.46	0.46	0.08	32.60

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,975.00	0.82	288.74	8,961.80	-119.92	-350.96	-106.34	0.08	0.04	5.16
9,000.00	0.88	295.35	8,986.80	-119.78	-351.30	-106.18	0.46	0.24	26.44
9,025.00	1.00	307.48	9,011.79	-119.57	-351.65	-105.95	0.93	0.48	48.52
9,050.00	1.04	311.49	9,036.79	-119.28	-351.99	-105.66	0.33	0.16	16.04
9,075.00	1.14	314.43	9,061.78	-118.96	-352.34	-105.32	0.46	0.40	11.76
9,100.00	1.25	312.95	9,086.78	-118.60	-352.71	-104.95	0.46	0.44	-5.92
9,125.00	1.31	309.89	9,111.77	-118.23	-353.13	-104.56	0.36	0.24	-12.24
9,150.00	1.35	309.64	9,136.77	-117.86	-353.58	-104.17	0.16	0.16	-1.00
9,175.00	1.29	311.61	9,161.76	-117.48	-354.02	-103.78	0.30	-0.24	7.88
9,200.00	1.16	315.59	9,186.75	-117.12	-354.40	-103.40	0.62	-0.52	15.92
9,225.00	1.11	316.48	9,211.75	-116.76	-354.75	-103.03	0.21	-0.20	3.56
9,250.00	1.05	320.52	9,236.74	-116.41	-355.06	-102.67	0.39	-0.24	16.16
9,275.00	0.73	345.53	9,261.74	-116.08	-355.25	-102.33	1.98	-1.28	100.04
9,300.00	0.70	30.79	9,286.74	-115.79	-355.21	-102.05	2.20	-0.12	181.04
9,325.00	0.75	45.51	9,311.74	-115.55	-355.01	-101.81	0.77	0.20	58.88
9,350.00	0.80	38.45	9,336.74	-115.29	-354.79	-101.56	0.43	0.20	-28.24
9,375.00	0.85	37.42	9,361.73	-115.01	-354.57	-101.29	0.21	0.20	-4.12
9,400.00	0.82	37.90	9,386.73	-114.72	-354.34	-101.01	0.12	-0.12	1.92
9,425.00	0.88	39.73	9,411.73	-114.43	-354.11	-100.73	0.26	0.24	7.32
9,450.00	0.86	44.79	9,436.72	-114.15	-353.86	-100.46	0.32	-0.08	20.24
9,475.00	0.85	44.22	9,461.72	-113.89	-353.59	-100.20	0.05	-0.04	-2.28
9,500.00	0.76	48.76	9,486.72	-113.64	-353.34	-99.97	0.44	-0.36	18.16
9,525.00	0.68	58.81	9,511.72	-113.46	-353.09	-99.80	0.60	-0.32	40.20
9,550.00	0.54	53.67	9,536.72	-113.31	-352.87	-99.66	0.60	-0.56	-20.56
9,575.00	0.46	54.44	9,561.72	-113.18	-352.69	-99.54	0.32	-0.32	3.08
9,600.00	0.43	66.03	9,586.71	-113.09	-352.52	-99.45	0.38	-0.12	46.36
9,625.00	0.39	75.06	9,611.71	-113.03	-352.35	-99.39	0.30	-0.16	36.12
9,650.00	0.47	94.25	9,636.71	-113.01	-352.17	-99.39	0.65	0.32	76.76
9,675.00	0.36	109.24	9,661.71	-113.05	-351.99	-99.43	0.61	-0.44	59.96
9,700.00	0.25	118.28	9,686.71	-113.10	-351.87	-99.48	0.48	-0.44	36.16
9,725.00	0.31	116.67	9,711.71	-113.15	-351.76	-99.54	0.24	0.24	-6.44
9,750.00	0.34	123.91	9,736.71	-113.23	-351.64	-99.62	0.20	0.12	28.96
9,775.00	0.38	126.61	9,761.71	-113.32	-351.51	-99.71	0.17	0.16	10.80
9,800.00	0.45	119.32	9,786.71	-113.41	-351.36	-99.82	0.35	0.28	-29.16
9,825.00	0.40	106.68	9,811.71	-113.49	-351.19	-99.90	0.42	-0.20	-50.56
9,850.00	0.37	113.06	9,836.71	-113.54	-351.03	-99.96	0.21	-0.12	25.52
9,875.00	0.36	125.61	9,861.71	-113.62	-350.90	-100.04	0.32	-0.04	50.20
9,900.00	0.40	126.64	9,886.71	-113.72	-350.76	-100.15	0.16	0.16	4.12
9,925.00	0.30	97.61	9,911.71	-113.78	-350.63	-100.21	0.80	-0.40	-116.12
9,950.00	0.22	354.78	9,936.71	-113.74	-350.57	-100.17	1.64	-0.32	-411.32
9,975.00	0.61	328.91	9,961.71	-113.58	-350.64	-100.01	1.69	1.56	-103.48
10,000.00	0.90	328.33	9,986.70	-113.30	-350.81	-99.72	1.16	1.16	-2.32
10,025.00	1.11	327.48	10,011.70	-112.93	-351.04	-99.34	0.84	0.84	-3.40
10,050.00	1.19	327.82	10,036.70	-112.50	-351.31	-98.91	0.32	0.32	1.36

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	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	1.30	326.88	10,061.69	-112.05	-351.61	-98.44	0.45	0.44	-3.76
10,100.00	1.20	329.36	10,086.68	-111.58	-351.89	-97.97	0.45	-0.40	9.92
10,125.00	1.00	329.05	10,111.68	-111.17	-352.14	-97.55	0.80	-0.80	-1.24
10,150.00	0.94	333.13	10,136.68	-110.80	-352.35	-97.17	0.37	-0.24	16.32
10,175.00	0.76	334.54	10,161.67	-110.47	-352.51	-96.83	0.72	-0.72	5.64
10,200.00	0.78	327.17	10,186.67	-110.17	-352.67	-96.53	0.40	0.08	-29.48
10,223.00	0.71	329.68	10,209.67	-109.92	-352.83	-96.27	0.34	-0.30	10.91
Tie In									
10,312.00	0.69	323.79	10,298.66	-109.01	-353.42	-95.34	0.08	-0.02	-6.62
First Phoenix MWD Survey									
10,375.00	0.75	302.98	10,361.66	-108.48	-353.99	-94.79	0.42	0.10	-33.03
10,407.00	2.64	342.28	10,393.64	-107.67	-354.39	-93.96	6.61	5.91	122.81
10,439.00	6.54	355.96	10,425.53	-105.14	-354.75	-91.42	12.57	12.19	42.75
10,470.00	10.42	2.30	10,456.19	-100.58	-354.76	-86.86	12.86	12.52	20.45
10,502.00	14.05	5.90	10,487.46	-93.82	-354.24	-80.13	11.59	11.34	11.25
10,533.00	17.43	5.74	10,517.29	-85.46	-353.39	-71.80	10.90	10.90	-0.52
10,564.00	19.79	2.70	10,546.67	-75.59	-352.68	-61.98	8.23	7.61	-9.81
10,596.00	21.74	1.80	10,576.59	-64.26	-352.24	-50.66	6.17	6.09	-2.81
10,628.00	23.41	1.63	10,606.14	-51.98	-351.87	-38.41	5.22	5.22	-0.53
10,660.00	26.91	1.87	10,635.10	-38.38	-351.45	-24.84	10.94	10.94	0.75
10,692.00	30.12	2.52	10,663.21	-23.12	-350.87	-9.61	10.08	10.03	2.03
10,724.00	33.29	2.63	10,690.43	-6.32	-350.11	7.15	9.91	9.91	0.34
10,755.00	35.67	3.11	10,715.98	11.20	-349.23	24.63	7.73	7.68	1.55
10,787.00	38.53	2.77	10,741.50	30.48	-348.24	43.85	8.96	8.94	-1.06
10,819.00	41.65	2.09	10,765.98	51.07	-347.37	64.39	9.85	9.75	-2.13
10,850.00	44.05	1.97	10,788.71	72.13	-346.62	85.41	7.75	7.74	-0.39
10,881.00	45.83	2.79	10,810.65	94.01	-345.71	107.24	6.04	5.74	2.65
10,913.00	48.60	2.69	10,832.38	117.47	-344.59	130.63	8.66	8.66	-0.31
10,945.00	51.10	1.54	10,853.02	141.91	-343.69	155.02	8.28	7.81	-3.59
10,977.00	53.78	0.42	10,872.52	167.27	-343.26	180.34	8.82	8.38	-3.50
11,008.00	55.71	0.36	10,890.41	192.58	-343.09	205.63	6.23	6.23	-0.19
11,040.00	58.39	0.62	10,907.82	219.43	-342.86	232.45	8.40	8.38	0.81
11,072.00	61.18	0.54	10,923.92	247.08	-342.58	260.07	8.72	8.72	-0.25
11,104.00	63.61	1.42	10,938.75	275.43	-342.09	288.38	7.98	7.59	2.75
11,135.00	66.62	1.18	10,951.79	303.54	-341.46	316.45	9.74	9.71	-0.77
11,167.00	69.63	1.09	10,963.71	333.23	-340.87	346.09	9.41	9.41	-0.28
11,199.00	72.19	0.84	10,974.18	363.46	-340.36	376.28	8.03	8.00	-0.78
11,231.00	74.88	0.56	10,983.25	394.14	-339.99	406.92	8.45	8.41	-0.88
11,263.00	77.28	0.49	10,990.94	425.20	-339.70	437.95	7.50	7.50	-0.22
11,294.00	80.27	1.00	10,996.98	455.60	-339.30	468.31	9.78	9.65	1.65
11,311.57	81.73	0.99	10,999.73	472.95	-339.00	485.64	8.31	8.31	-0.06
FTP: 11311.57' MD									
11,326.00	82.93	0.98	11,001.65	487.25	-338.76	499.92	8.31	8.31	-0.06



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	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)
11,408.00	87.93	2.00	11,008.18	568.93	-336.63	581.46	6.22	6.10	1.24
11,504.00	91.82	2.33	11,008.39	664.85	-333.00	677.16	4.07	4.05	0.34
11,599.00	93.39	2.11	11,004.07	759.67	-329.33	771.78	1.67	1.65	-0.23
11,695.00	91.29	0.61	11,000.16	855.56	-327.05	867.50	2.69	-2.19	-1.56
11,791.00	90.70	358.94	10,998.49	951.54	-327.43	963.43	1.84	-0.61	-1.74
11,886.00	90.92	358.41	10,997.15	1,046.50	-329.63	1,058.41	0.60	0.23	-0.56
11,982.00	92.49	359.46	10,994.29	1,142.44	-331.41	1,154.34	1.97	1.64	1.09
12,077.00	90.00	359.45	10,992.22	1,237.41	-332.31	1,249.27	2.62	-2.62	-0.01
12,172.00	90.17	358.88	10,992.08	1,332.39	-333.70	1,344.24	0.63	0.18	-0.60
12,267.00	90.34	357.87	10,991.66	1,427.35	-336.39	1,439.24	1.08	0.18	-1.06
12,363.00	90.36	358.60	10,991.07	1,523.31	-339.35	1,535.23	0.76	0.02	0.76
12,458.00	90.42	358.12	10,990.43	1,618.27	-342.07	1,630.22	0.51	0.06	-0.51
12,553.00	90.67	357.46	10,989.52	1,713.19	-345.73	1,725.22	0.74	0.26	-0.69
12,648.00	90.17	358.83	10,988.83	1,808.13	-348.81	1,820.21	1.54	-0.53	1.44
12,743.00	91.15	358.55	10,987.73	1,903.10	-350.98	1,915.19	1.07	1.03	-0.29
12,839.00	90.70	359.24	10,986.18	1,999.07	-352.83	2,011.16	0.86	-0.47	0.72
12,934.00	90.78	359.31	10,984.96	2,094.06	-354.03	2,106.12	0.11	0.08	0.07
13,029.00	90.14	359.83	10,984.19	2,189.05	-354.74	2,201.07	0.87	-0.67	0.55
13,125.00	90.70	359.76	10,983.49	2,285.05	-355.09	2,297.01	0.59	0.58	-0.07
13,220.00	92.02	359.49	10,981.24	2,380.01	-355.71	2,391.93	1.42	1.39	-0.28
13,315.00	91.04	0.00	10,978.70	2,474.98	-356.13	2,486.84	1.16	-1.03	0.54
13,410.00	92.32	0.16	10,975.91	2,569.94	-356.00	2,581.73	1.36	1.35	0.17
13,505.00	91.23	0.45	10,972.97	2,664.89	-355.49	2,676.59	1.19	-1.15	0.31
13,601.00	91.46	0.15	10,970.72	2,760.86	-354.99	2,772.47	0.39	0.24	-0.31
13,696.00	92.19	359.53	10,967.69	2,855.81	-355.26	2,867.36	1.01	0.77	-0.65
13,800.00	89.61	359.13	10,966.06	2,959.78	-356.47	2,971.30	2.51	-2.48	-0.38
13,896.00	90.48	358.45	10,965.98	3,055.76	-358.50	3,067.28	1.15	0.91	-0.71
13,991.00	90.89	357.67	10,964.85	3,150.70	-361.71	3,162.28	0.93	0.43	-0.82
14,086.00	89.36	359.86	10,964.64	3,245.66	-363.76	3,257.25	2.81	-1.61	2.31
14,181.00	90.17	359.34	10,965.03	3,340.66	-364.42	3,352.20	1.01	0.85	-0.55
14,276.00	91.09	359.29	10,963.99	3,435.65	-365.56	3,447.16	0.97	0.97	-0.05
14,370.00	91.96	359.08	10,961.48	3,529.60	-366.90	3,541.10	0.95	0.93	-0.22
14,463.00	90.92	0.35	10,959.15	3,622.57	-367.36	3,634.02	1.76	-1.12	1.37
14,557.00	89.24	1.11	10,959.02	3,716.56	-366.16	3,727.89	1.96	-1.79	0.81
14,652.00	89.86	0.50	10,959.76	3,811.54	-364.83	3,822.75	0.92	0.65	-0.64
14,747.00	90.53	359.82	10,959.44	3,906.54	-364.56	3,917.67	1.00	0.71	-0.72
14,842.00	91.43	359.06	10,957.81	4,001.52	-365.49	4,012.62	1.24	0.95	-0.80
14,937.00	89.50	0.19	10,957.04	4,096.51	-366.11	4,107.56	2.35	-2.03	1.19
15,031.00	90.28	0.07	10,957.22	4,190.51	-365.90	4,201.48	0.84	0.83	-0.13
15,125.00	91.60	359.62	10,955.68	4,284.49	-366.15	4,295.41	1.48	1.40	-0.48
15,220.00	89.86	359.23	10,954.47	4,379.48	-367.11	4,390.36	1.88	-1.83	-0.41
15,315.00	91.32	358.68	10,953.49	4,474.45	-368.84	4,485.33	1.64	1.54	-0.58
15,409.00	88.80	359.54	10,953.39	4,568.43	-370.30	4,579.30	2.83	-2.68	0.91
15,503.00	89.58	359.31	10,954.72	4,662.42	-371.24	4,673.25	0.87	0.83	-0.24

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 504H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3767.60usft (McVay 8)
Site:	Huckleberry State Com	MD Reference:	KB=26' @ 3767.60usft (McVay 8)
Well:	504H	North Reference:	Grid
Wellbore:	OH/64546	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 8)	Database:	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,597.00	90.53	358.58	10,954.63	4,756.40	-372.97	4,767.23	1.27	1.01	-0.78
15,691.00	92.16	357.88	10,952.43	4,850.33	-375.87	4,861.19	1.89	1.73	-0.74
15,785.00	92.10	359.61	10,948.93	4,944.24	-377.93	4,955.11	1.84	-0.06	1.84
15,880.00	90.84	0.35	10,946.50	5,039.20	-377.96	5,050.01	1.54	-1.33	0.78
15,975.00	90.62	359.60	10,945.29	5,134.19	-378.01	5,144.93	0.82	-0.23	-0.79
16,069.00	91.74	359.08	10,943.35	5,228.17	-379.09	5,238.88	1.31	1.19	-0.55
16,164.00	90.17	0.15	10,941.77	5,323.15	-379.73	5,333.81	2.00	-1.65	1.13
16,257.00	89.52	0.97	10,942.02	5,416.14	-378.82	5,426.70	1.13	-0.70	0.88
16,352.00	88.32	1.36	10,943.81	5,511.10	-376.89	5,521.52	1.33	-1.26	0.41
16,448.00	89.64	0.97	10,945.52	5,607.06	-374.93	5,617.34	1.43	1.38	-0.41
16,542.00	89.64	0.48	10,946.11	5,701.05	-373.75	5,711.21	0.52	0.00	-0.52
16,637.00	88.29	0.46	10,947.82	5,796.03	-372.97	5,806.09	1.42	-1.42	-0.02
16,731.00	89.30	0.15	10,949.80	5,890.01	-372.47	5,899.98	1.12	1.07	-0.33
16,825.00	92.27	359.38	10,948.51	5,983.99	-372.85	5,993.90	3.26	3.16	-0.82
16,921.00	90.59	359.10	10,946.12	6,079.95	-374.12	6,089.84	1.77	-1.75	-0.29
17,014.00	91.48	358.38	10,944.44	6,172.91	-376.17	6,182.81	1.23	0.96	-0.77
17,108.00	89.61	359.00	10,943.54	6,266.87	-378.32	6,276.79	2.10	-1.99	0.66
17,204.00	90.70	359.99	10,943.28	6,362.87	-379.16	6,372.74	1.53	1.14	1.03
17,298.00	89.41	0.79	10,943.19	6,456.86	-378.52	6,466.64	1.61	-1.37	0.85
17,392.00	90.98	0.91	10,942.87	6,550.85	-377.13	6,560.51	1.68	1.67	0.13
17,487.00	89.50	1.02	10,942.48	6,645.83	-375.53	6,655.36	1.56	-1.56	0.12
17,582.00	90.36	0.72	10,942.59	6,740.82	-374.09	6,750.22	0.96	0.91	-0.32
17,677.00	89.86	359.91	10,942.41	6,835.82	-373.57	6,845.13	1.00	-0.53	-0.85
17,772.00	89.38	0.32	10,943.04	6,930.82	-373.37	6,940.05	0.66	-0.51	0.43
17,867.00	91.23	359.75	10,942.53	7,025.81	-373.32	7,034.97	2.04	1.95	-0.60
17,962.00	91.40	359.18	10,940.35	7,120.78	-374.20	7,129.90	0.63	0.18	-0.60
18,057.00	92.07	359.07	10,937.48	7,215.72	-375.65	7,224.83	0.71	0.71	-0.12
18,152.00	90.73	357.89	10,935.16	7,310.66	-378.17	7,319.79	1.88	-1.41	-1.24
18,246.00	89.83	357.75	10,934.70	7,404.59	-381.75	7,413.79	0.97	-0.96	-0.15
18,340.00	89.50	357.83	10,935.25	7,498.52	-385.37	7,507.79	0.36	-0.35	0.09
18,436.00	91.18	357.17	10,934.68	7,594.42	-389.56	7,603.78	1.88	1.75	-0.69
18,530.00	89.55	356.46	10,934.08	7,688.27	-394.78	7,697.76	1.89	-1.73	-0.76
18,624.00	90.81	356.71	10,933.78	7,782.10	-400.38	7,791.74	1.37	1.34	0.27
18,720.00	88.96	356.97	10,933.98	7,877.95	-405.67	7,887.72	1.95	-1.93	0.27
18,815.00	88.80	357.51	10,935.83	7,972.82	-410.25	7,982.70	0.59	-0.17	0.57
18,910.00	88.01	359.05	10,938.48	8,067.74	-413.10	8,077.66	1.82	-0.83	1.62
19,006.00	88.32	0.57	10,941.55	8,163.68	-413.42	8,173.54	1.62	0.32	1.58
19,101.00	90.03	1.50	10,942.92	8,258.65	-411.70	8,268.38	2.05	1.80	0.98
19,197.00	91.99	1.83	10,941.23	8,354.59	-408.91	8,364.14	2.07	2.04	0.34
19,292.00	91.57	1.28	10,938.28	8,449.51	-406.33	8,458.89	0.73	-0.44	-0.58
19,359.09	92.72	1.15	10,935.76	8,516.54	-404.91	8,525.81	1.73	1.71	-0.19
19,387.00	91.23	1.39	10,934.80	8,544.43	-404.29	8,553.65	5.41	-5.34	0.86
19,482.00	89.92	0.71	10,933.85	8,639.40	-402.55	8,648.49	1.55	-1.38	-0.72



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Huckleberry State Com
Well: 504H
Wellbore: OH/64546
Design: Surveys (McVay 8)

Local Co-ordinate Reference: Well 504H
TVD Reference: KB=26' @ 3767.60usft (McVay 8)
MD Reference: KB=26' @ 3767.60usft (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)
19,578.00	91.40	1.53	10,932.74	8,735.37	-400.68	8,744.32	1.76	1.54	0.85
19,672.00	90.81	1.29	10,930.93	8,829.33	-398.37	8,838.12	0.68	-0.63	-0.26
19,766.00	89.69	0.93	10,930.52	8,923.31	-396.54	8,931.96	1.25	-1.19	-0.38
19,861.00	91.46	1.00	10,929.57	9,018.29	-394.94	9,026.80	1.86	1.86	0.07
19,957.00	90.59	359.90	10,927.85	9,114.26	-394.19	9,122.68	1.46	-0.91	-1.15
20,052.00	90.03	359.45	10,927.34	9,209.26	-394.73	9,217.63	0.76	-0.59	-0.47
20,148.00	89.02	359.28	10,928.13	9,305.25	-395.79	9,313.59	1.07	-1.05	-0.18
20,242.00	88.88	358.57	10,929.85	9,399.22	-397.56	9,407.55	0.77	-0.15	-0.76
20,336.00	89.97	357.99	10,930.80	9,493.17	-400.38	9,501.54	1.31	1.16	-0.62
20,432.00	88.66	357.63	10,931.95	9,589.09	-404.05	9,597.53	1.42	-1.36	-0.38
20,526.00	88.71	357.35	10,934.10	9,682.97	-408.16	9,691.51	0.30	0.05	-0.30
20,619.00	88.04	358.08	10,936.74	9,775.86	-411.87	9,784.47	1.07	-0.72	0.78
20,715.00	87.39	357.74	10,940.57	9,871.72	-415.37	9,880.39	0.76	-0.68	-0.35
20,810.00	87.67	358.27	10,944.66	9,966.58	-418.67	9,975.30	0.63	0.29	0.56
20,905.00	87.42	0.35	10,948.73	10,061.48	-419.81	10,070.18	2.20	-0.26	2.19
21,000.00	90.70	1.10	10,950.29	10,156.44	-418.61	10,165.03	3.54	3.45	0.79
21,094.00	91.71	0.83	10,948.31	10,250.41	-417.03	10,258.86	1.11	1.07	-0.29
21,188.00	92.69	0.67	10,944.70	10,344.33	-415.80	10,352.67	1.06	1.04	-0.17
21,211.04	92.96	0.65	10,943.57	10,367.34	-415.53	10,375.65	1.18	1.18	-0.11
LTP: 21211.04' MD									
21,245.00	93.36	0.61	10,941.70	10,401.24	-415.16	10,409.52	1.18	1.18	-0.11
Final Phoenix MWD Survey									
21,305.00	93.36	0.61	10,938.18	10,461.14	-414.52	10,469.35	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)	
10,223.00	10,209.67	-109.92	-352.83	Tie In
10,312.00	10,298.66	-109.01	-353.42	First Phoenix MWD Survey
11,311.57	10,999.73	472.95	-339.00	FTP: 11311.57' MD
21,211.04	10,943.57	10,367.34	-415.53	LTP: 21211.04' MD
21,245.00	10,941.70	10,401.24	-415.16	Final Phoenix MWD Survey
21,305.00	10,938.18	10,461.14	-414.53	Projection to TD