



PHOENIX
TECHNOLOGY SERVICES

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EMNRD-OCDARTESIA

COG Operating LLC

Eddy County, NM (NAD27 NME)

Myox 6 State Com

501H

OH / 65025

Survey: Phoenix MWD Surveys

Standard Survey Report

12 August, 2019





Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 501H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3104.00usft (Ensign 155)
Site:	Myox 6 State Com	MD Reference:	RKB @ 3104.00usft (Ensign 155)
Well:	501H	North Reference:	Grid
Wellbore:	OH / 65025	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

Project	Eddy 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	Myox 6 State Com		
Site Position:		Northing:	392,266.10 usft
From:	Map	Easting:	563,486.50 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 4' 41.841669 N
		Longitude:	104° 7' 42.097797 W
		Grid Convergence:	0.11 °

Well	501H		
Well Position	+N/-S	0.00 usft	Northing: 391,782.00 usft
	+E/-W	0.00 usft	Easting: 562,383.20 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 4' 37.071312 N
		Longitude:	104° 7' 54.931865 W
		Ground Level:	3,080.00 usft

Wellbore	OH / 65025		
Magnetics	Model Name	Sample Date	Declination
			(°)
	MVHD	8/18/2019	7.00
			Dip Angle (°)
			59.72
			Field Strength (nT)
			47,822.40443309

Design	Surveys (Ensign 155)		
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Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00

Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	182.80

Survey Program	Date	8/12/2019		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
100.00	7,240.00	Scientific Gyros (OH / 65025)	Scientific Keeper	Scientific Drilling Intl. Standard Wireline Keeper
7,310.00	17,636.00	Phoenix MWD Surveys (OH / 65025)	MWD+HRGM	OWSG MWD + HRGM

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate	
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
7,240.00	3.57	277.69	7,232.17	-2.46	-244.86	14.42	0.00	0.00	0.00	
Tie In										
7,310.00	1.23	257.86	7,302.11	-2.33	-247.75	14.43	3.50	-3.34	-28.33	
First Phoenix MWD Survey										
7,404.00	2.80	261.08	7,396.05	-2.90	-251.01	15.16	1.67	1.67	3.43	
7,436.00	6.31	227.09	7,427.94	-4.22	-253.07	16.57	13.39	10.97	-106.22	
7,467.00	10.19	221.54	7,458.62	-7.43	-256.14	19.93	12.76	12.52	-17.90	
7,498.00	13.29	219.03	7,488.97	-12.25	-260.20	24.95	10.13	10.00	-8.10	
7,530.00	16.24	216.52	7,519.91	-18.71	-265.18	31.64	9.43	9.22	-7.84	

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Wellbore:	OH / 65025	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)	
7,561.00	19.57	214.95	7,549.40	-26.45	-270.74	39.64	10.85	10.74	-5.06	
7,593.00	22.13	212.49	7,579.30	-35.93	-277.05	49.42	8.45	8.00	-7.69	
7,624.00	25.33	207.34	7,607.68	-46.75	-283.23	60.53	12.29	10.32	-16.61	
7,655.00	28.45	202.02	7,635.33	-59.49	-289.05	73.54	12.70	10.06	-17.16	
7,687.00	30.68	199.28	7,663.16	-74.26	-294.60	88.56	8.15	6.97	-8.56	
7,718.00	33.00	199.03	7,689.50	-89.71	-299.97	104.26	7.50	7.48	-0.81	
7,749.00	34.87	197.30	7,715.22	-106.15	-305.35	120.94	6.79	6.03	-5.58	
7,781.00	37.34	196.19	7,741.07	-124.21	-310.78	139.24	7.98	7.72	-3.47	
7,812.00	42.11	195.67	7,764.91	-143.26	-316.21	158.53	15.42	15.39	-1.68	
7,844.00	47.53	195.81	7,787.59	-164.96	-322.33	180.51	16.94	16.94	0.44	
7,874.00	53.03	196.10	7,806.76	-187.14	-328.67	202.97	18.35	18.33	0.97	
7,905.00	59.49	196.91	7,823.97	-211.84	-336.00	228.00	20.95	20.84	2.61	
7,936.00	65.86	197.37	7,838.19	-238.14	-344.11	254.67	20.59	20.55	1.48	
7,949.00	67.19	197.60	7,843.37	-249.51	-347.70	266.20	10.36	10.23	1.77	
7,981.00	72.65	197.08	7,854.35	-278.19	-356.65	295.28	17.13	17.06	-1.63	
8,012.00	77.23	196.14	7,862.40	-306.87	-365.20	324.34	15.06	14.77	-3.03	
8,043.00	79.71	195.35	7,868.60	-336.10	-373.44	353.94	8.38	8.00	-2.55	
8,076.00	81.28	195.54	7,874.05	-367.47	-382.11	385.70	4.79	4.76	0.58	
8,107.00	82.58	195.51	7,878.40	-397.05	-390.33	415.64	4.19	4.19	-0.10	
8,138.00	84.32	195.53	7,881.94	-426.72	-398.57	445.68	5.61	5.61	0.06	
8,170.00	85.99	195.78	7,884.64	-457.42	-407.17	476.76	5.28	5.22	0.78	
8,201.00	87.63	195.84	7,886.37	-487.20	-415.60	506.92	5.29	5.29	0.19	
8,232.00	89.74	195.93	7,887.08	-517.01	-424.08	537.11	6.81	6.81	0.29	
8,296.00	90.71	191.84	7,886.83	-579.12	-439.44	599.90	6.57	1.52	-6.39	
8,390.00	90.33	189.83	7,885.97	-671.44	-457.11	692.97	2.18	-0.40	-2.14	
8,484.00	89.91	186.18	7,885.78	-764.51	-470.20	786.56	3.91	-0.45	-3.88	
8,578.00	89.89	186.54	7,885.94	-857.93	-480.61	880.38	0.38	-0.02	0.38	
8,672.00	89.03	183.93	7,886.83	-951.52	-489.18	974.28	2.92	-0.91	-2.78	
8,766.00	89.05	184.18	7,888.40	-1,045.27	-495.83	1,068.25	0.27	0.02	0.27	
8,862.00	89.18	184.49	7,889.88	-1,140.99	-503.09	1,164.20	0.35	0.14	0.32	
8,956.00	90.32	182.87	7,890.29	-1,234.79	-509.12	1,258.18	2.11	1.21	-1.72	
9,051.00	90.90	180.89	7,889.28	-1,329.73	-512.23	1,353.16	2.17	0.61	-2.08	
9,146.00	93.53	178.94	7,885.61	-1,424.64	-512.10	1,447.96	3.45	2.77	-2.05	
9,240.00	92.17	178.96	7,880.94	-1,518.51	-510.38	1,541.63	1.45	-1.45	0.02	
9,334.00	92.75	179.18	7,876.90	-1,612.41	-508.85	1,635.34	0.66	0.62	0.23	
9,428.00	93.01	179.38	7,872.18	-1,706.28	-507.67	1,729.05	0.35	0.28	0.21	
9,522.00	92.81	179.38	7,867.41	-1,800.16	-506.66	1,822.76	0.21	-0.21	0.00	
9,616.00	92.96	180.00	7,862.68	-1,894.03	-506.15	1,916.50	0.68	0.16	0.66	
9,710.00	90.34	179.89	7,859.97	-1,987.99	-506.06	2,010.33	2.79	-2.79	-0.12	
9,804.00	88.76	179.74	7,860.71	-2,081.98	-505.75	2,104.20	1.69	-1.68	-0.16	
9,898.00	88.71	180.48	7,862.78	-2,175.96	-505.93	2,198.07	0.79	-0.05	0.79	
9,992.00	88.23	181.30	7,865.29	-2,269.91	-507.39	2,291.99	1.01	-0.51	0.87	
10,086.00	88.09	182.12	7,868.31	-2,363.82	-510.20	2,385.92	0.88	-0.15	0.87	

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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)
10,179.00	89.16	180.42	7,870.54	-2,456.77	-512.26	2,478.86	2.16	1.15	-1.83
10,273.00	89.25	180.39	7,871.85	-2,550.75	-512.92	2,572.77	0.10	0.10	-0.03
10,367.00	89.53	181.06	7,872.85	-2,644.74	-514.11	2,666.70	0.77	0.30	0.71
10,461.00	89.83	178.93	7,873.37	-2,738.73	-514.10	2,760.58	2.29	0.32	-2.27
10,555.00	90.03	179.47	7,873.49	-2,832.72	-512.79	2,854.39	0.61	0.21	0.57
10,645.00	90.46	180.13	7,873.10	-2,922.72	-512.48	2,944.27	0.88	0.48	0.73
10,735.00	89.96	177.93	7,872.77	-3,012.70	-510.95	3,034.07	2.51	-0.56	-2.44
10,825.00	90.10	177.69	7,872.73	-3,102.64	-507.51	3,123.73	0.31	0.16	-0.27
10,915.00	90.48	178.93	7,872.27	-3,192.60	-504.86	3,213.45	1.44	0.42	1.38
11,007.00	90.69	179.52	7,871.33	-3,284.58	-503.61	3,305.26	0.68	0.23	0.64
11,099.00	90.68	180.54	7,870.23	-3,376.57	-503.66	3,397.15	1.11	-0.01	1.11
11,189.00	90.71	181.31	7,869.14	-3,466.55	-505.12	3,487.09	0.86	0.03	0.86
11,279.00	90.07	179.53	7,868.53	-3,556.55	-505.78	3,577.01	2.10	-0.71	-1.98
11,373.00	90.55	179.38	7,868.02	-3,650.54	-504.88	3,670.85	0.53	0.51	-0.16
11,465.00	90.53	179.68	7,867.15	-3,742.53	-504.13	3,762.69	0.33	-0.02	0.33
11,557.00	90.04	179.37	7,866.69	-3,834.53	-503.36	3,854.54	0.63	-0.53	-0.34
11,651.00	89.82	179.23	7,866.81	-3,928.52	-502.22	3,948.36	0.28	-0.23	-0.15
11,746.00	89.53	179.19	7,867.35	-4,023.51	-500.91	4,043.18	0.31	-0.31	-0.04
11,840.00	91.17	178.48	7,866.77	-4,117.49	-498.99	4,136.95	1.90	1.74	-0.76
11,934.00	91.54	178.61	7,864.55	-4,211.43	-496.61	4,230.66	0.42	0.39	0.14
12,028.00	91.61	179.28	7,861.97	-4,305.38	-494.88	4,324.41	0.72	0.07	0.71
12,122.00	91.16	179.34	7,859.69	-4,399.34	-493.75	4,418.21	0.48	-0.48	0.06
12,217.00	90.62	179.33	7,858.22	-4,494.32	-492.64	4,513.02	0.57	-0.57	-0.01
12,311.00	89.87	179.51	7,857.82	-4,588.32	-491.69	4,606.86	0.82	-0.80	0.19
12,405.00	89.96	180.01	7,857.96	-4,682.32	-491.30	4,700.73	0.54	0.10	0.53
12,499.00	90.11	180.26	7,857.90	-4,776.32	-491.52	4,794.62	0.31	0.16	0.27
12,593.00	89.89	180.56	7,857.90	-4,870.31	-492.19	4,888.54	0.40	-0.23	0.32
12,687.00	89.37	179.31	7,858.51	-4,964.31	-492.09	4,982.42	1.44	-0.55	-1.33
12,781.00	89.47	179.74	7,859.46	-5,058.30	-491.31	5,076.26	0.47	0.11	0.46
12,875.00	89.28	180.12	7,860.48	-5,152.29	-491.19	5,170.14	0.45	-0.20	0.40
12,970.00	89.19	180.85	7,861.75	-5,247.28	-492.00	5,265.05	0.77	-0.09	0.77
13,064.00	90.67	179.53	7,861.87	-5,341.28	-492.31	5,358.95	2.11	1.57	-1.40
13,159.00	91.37	179.92	7,860.17	-5,436.26	-491.85	5,453.80	0.84	0.74	0.41
13,254.00	91.42	180.53	7,857.86	-5,531.23	-492.23	5,548.67	0.64	0.05	0.64
13,348.00	91.68	181.25	7,855.32	-5,625.18	-493.68	5,642.59	0.81	0.28	0.77
13,443.00	91.33	181.81	7,852.82	-5,720.12	-496.22	5,737.53	0.69	-0.37	0.59
13,537.00	90.51	179.96	7,851.31	-5,814.09	-497.67	5,831.46	2.15	-0.87	-1.97
13,631.00	90.55	179.70	7,850.44	-5,908.08	-497.39	5,925.33	0.28	0.04	-0.28
13,725.00	91.00	180.36	7,849.17	-6,002.08	-497.44	6,019.21	0.85	0.48	0.70
13,819.00	89.32	178.90	7,848.91	-6,096.07	-496.84	6,113.06	2.37	-1.79	-1.55
13,914.00	88.60	179.02	7,850.64	-6,191.03	-495.11	6,207.83	0.77	-0.76	0.13
14,008.00	88.50	179.64	7,853.01	-6,285.00	-494.01	6,301.63	0.67	-0.11	0.66
14,103.00	88.62	179.83	7,855.40	-6,379.97	-493.57	6,396.46	0.24	0.13	0.20
14,197.00	88.38	180.89	7,857.86	-6,473.93	-494.16	6,490.34	1.16	-0.26	1.13

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14,291.00	89.17	180.97	7,859.87	-6,567.90	-495.69	6,584.27	0.84	0.84	0.09
14,385.00	90.19	179.67	7,860.40	-6,661.89	-496.21	6,678.18	1.76	1.09	-1.38
14,479.00	90.78	178.59	7,859.60	-6,755.87	-494.79	6,771.98	1.31	0.63	-1.15
14,574.00	91.11	178.93	7,858.03	-6,850.84	-492.73	6,866.73	0.50	0.35	0.36
14,668.00	91.15	179.07	7,856.18	-6,944.81	-491.09	6,960.51	0.15	0.04	0.15
14,762.00	90.70	179.07	7,854.66	-7,038.78	-489.57	7,054.29	0.48	-0.48	0.00
14,856.00	90.85	179.73	7,853.39	-7,132.77	-488.58	7,148.12	0.72	0.16	0.70
14,951.00	91.16	180.19	7,851.72	-7,227.75	-488.51	7,242.99	0.58	0.33	0.48
15,045.00	90.61	179.43	7,850.27	-7,321.74	-488.20	7,336.85	1.00	-0.59	-0.81
15,140.00	90.85	179.58	7,849.06	-7,416.73	-487.38	7,431.68	0.30	0.25	0.16
15,235.00	91.21	180.04	7,847.35	-7,511.71	-487.07	7,526.54	0.61	0.38	0.48
15,329.00	91.40	180.48	7,845.21	-7,605.69	-487.49	7,620.42	0.51	0.20	0.47
15,423.00	89.06	180.27	7,844.84	-7,699.68	-488.11	7,714.33	2.50	-2.49	-0.22
15,518.00	88.85	180.65	7,846.57	-7,794.66	-488.87	7,809.23	0.46	-0.22	0.40
15,611.00	88.63	180.83	7,848.61	-7,887.63	-490.07	7,902.15	0.31	-0.24	0.19
15,705.00	89.42	179.80	7,850.21	-7,981.61	-490.59	7,996.05	1.38	0.84	-1.10
15,799.00	89.71	179.23	7,850.93	-8,075.60	-489.79	8,089.89	0.68	0.31	-0.61
15,893.00	90.16	179.91	7,851.03	-8,169.60	-489.09	8,183.74	0.87	0.48	0.72
15,988.00	88.76	179.92	7,851.93	-8,264.59	-488.95	8,278.61	1.47	-1.47	0.01
16,082.00	89.70	178.07	7,853.19	-8,358.57	-487.30	8,372.39	2.21	1.00	-1.97
16,176.00	90.65	177.52	7,852.91	-8,452.49	-483.68	8,466.03	1.17	1.01	-0.59
16,270.00	92.05	177.97	7,850.69	-8,546.39	-479.98	8,559.64	1.56	1.49	0.48
16,364.00	90.84	178.75	7,848.32	-8,640.32	-477.30	8,653.32	1.53	-1.29	0.83
16,458.00	90.21	179.16	7,847.46	-8,734.30	-475.58	8,747.11	0.80	-0.67	0.44
16,553.00	90.25	179.15	7,847.08	-8,829.29	-474.18	8,841.91	0.04	0.04	-0.01
16,647.00	90.42	179.64	7,846.53	-8,923.28	-473.19	8,935.75	0.55	0.18	0.52
16,739.00	90.23	179.70	7,846.01	-9,015.28	-472.66	9,027.61	0.22	-0.21	0.07
16,834.00	90.99	180.73	7,845.00	-9,110.27	-473.01	9,122.50	1.35	0.80	1.08
16,928.00	90.29	180.79	7,843.95	-9,204.26	-474.26	9,216.44	0.75	-0.74	0.06
17,023.00	90.55	180.99	7,843.25	-9,299.24	-475.74	9,311.38	0.35	0.27	0.21
17,117.00	89.11	181.09	7,843.53	-9,393.23	-477.44	9,405.33	1.54	-1.53	0.11
17,211.00	89.13	181.63	7,844.97	-9,487.19	-479.67	9,499.29	0.57	0.02	0.57
17,305.00	89.71	182.17	7,845.92	-9,581.13	-482.79	9,593.28	0.84	0.62	0.57
17,399.00	90.24	180.70	7,845.96	-9,675.10	-485.14	9,687.25	1.66	0.56	-1.56
17,493.00	90.54	180.68	7,845.32	-9,769.09	-486.28	9,781.18	0.32	0.32	-0.02
17,575.00	91.08	181.00	7,844.17	-9,851.07	-487.48	9,863.12	0.77	0.66	0.39
Final Phoenix MWD Survey									
17,586.60	91.08	181.00	7,843.95	-9,862.67	-487.68	9,874.72	0.00	0.00	0.00
LTP: 17587' MD									
17,636.00	91.08	181.00	7,843.02	-9,912.05	-488.54	9,924.08	0.00	0.00	0.00
Projection to TD									



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 501H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3104.00usft (Ensign 155)
Site:	Myox 6 State Com	MD Reference:	RKB @ 3104.00usft (Ensign 155)
Well:	501H	North Reference:	Grid
Wellbore:	OH / 65025	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,240.00	7,232.17	-2.46	-244.86	Tie In
7,310.00	7,302.11	-2.33	-247.75	First Phoenix MWD Survey
17,575.00	7,844.17	-9,851.07	-487.48	Final Phoenix MWD Survey
17,586.60	7,843.95	-9,862.67	-487.68	LTP: 17587' MD
17,636.00	7,843.02	-9,912.05	-488.54	Projection to TD