



COG Operating LLC

COG Operating LLC

Eddy County, NM (NAD-27 2015)

McIntyre DK Federal Com #28H

API #: 30-015-41273

SHL: 465' FSL, 285' FWL, Sec 17, T17S, R30E, Unit M

PP: 440' FSL, 330' FWL, Sec 17, T17S, R30E, Unit M

BHL: 356' FSL, 589' FWL, Sec 16, T17S, R30E, Unit M

Design: BHL: 350' FSL, 590' FWL, Sec 16, T17S, R30E, Unit M

Standard Survey Report

11 April, 2017

NM OIL CONSERVATION

ARTESIA DISTRICT

JUL 03 2017

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TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 465' FSL, 285' FWL, Sec 17, T17S, R30E, Unit M
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3664.00usft (Patriot 6)
Site:	McIntyre DK Federal Com #28H	MD Reference:	KB @ 3664.00usft (Patriot 6)
Well:	SHL: 465' FSL, 285' FWL, Sec 17, T17S, R30E, Unit M	North Reference:	Grid
Wellbore:	BHL: 350' FSL, 590' FWL, Sec 16, T17S, R30E, Unit M	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FSL, 590' FWL, Sec 16, T17S, R30E, Unit M	Database:	EDM 5000.1 Single User Db

Project	Eddy County, NM (NAD-27 2015)		
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	McIntyre DK Federal Com #28H		
Site Position:		Northing:	665,262.20 usft
From:	Map	Easting:	601,988.90 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	32° 49' 42.428 N
		Longitude:	104° 0' 4.724 W
		Grid Convergence:	0.18 °

Well	SHL: 465' FSL, 285' FWL, Sec 17, T17S, R30E, Unit M		
Well Position	+N-S	0.00 usft	Northing: 665,262.20 usft
	+E-W	0.00 usft	Easting: 601,988.90 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 49' 42.428 N
		Longitude:	104° 0' 4.724 W
		Ground Level:	3,646.00 usft

Wellbore	BHL: 350' FSL, 590' FWL, Sec 16, T17S, R30E, Unit M				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/26/2016	7.35	60.56	48,393

Design	BHL: 350' FSL, 590' FWL, Sec 16, T17S, R30E, Unit M			
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	91.02

Survey Program	Date	4/11/2017		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	1,030.00	VES Gyro #1 (BHL: 350' FSL, 590' FWL, S	VES-ISCWSA-GYRO-3	Biaxial Semi-Cont. Gyro
1,138.00	10,492.00	TDS MWD #2 (BHL: 350' FSL, 590' FWL,	MWD	MWD - Standard

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	0.14	141.00	100.00	-0.09	0.08	0.08	0.14	0.14	0.00
200.00	0.23	157.35	200.00	-0.38	0.23	0.24	0.10	0.09	16.35
300.00	0.37	92.98	300.00	-0.58	0.63	0.64	0.34	0.14	-64.37
400.00	0.91	69.80	399.99	-0.32	1.70	1.70	0.59	0.54	-23.18
500.00	1.24	86.65	499.97	0.02	3.52	3.52	0.45	0.33	16.85
600.00	1.51	94.75	599.95	-0.03	5.92	5.92	0.33	0.27	8.10



TDS
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Site: McIntyre DK Federal Com #28H
Well: SHL: 465' FSL, 285' FWL, Sec 17, T17S, R30E, Unit M
Wellbore: BHL: 350' FSL, 590' FWL, Sec 16, T17S, R30E, Unit M
Design: BHL: 350' FSL, 590' FWL, Sec 16, T17S, R30E, Unit M

Local Co-ordinate Reference: Well SHL: 465' FSL, 285' FWL, Sec 17, T17S, R30E, Unit M
TVD Reference: KB @ 3664.00usft (Patriot 6)
MD Reference: KB @ 3664.00usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

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)	
700.00	1.68	93.50	699.91	-0.23	8.69	8.70	0.17	0.17	-1.25	
800.00	1.82	88.10	799.86	-0.26	11.74	11.75	0.22	0.14	-5.40	
900.00	2.24	89.86	899.80	-0.21	15.28	15.29	0.42	0.42	1.76	
1,000.00	2.38	89.02	999.72	-0.17	19.32	19.32	0.14	0.14	-0.84	
1,030.00	2.50	87.47	1,029.69	-0.13	20.59	20.59	0.46	0.40	-5.17	
Tie-In to VES Gyro Survey										
1,138.00	3.00	93.20	1,137.56	-0.18	25.77	25.77	0.53	0.46	5.31	
First TDS MWD Survey										
1,201.00	2.70	101.90	1,200.49	-0.58	28.86	28.87	0.83	-0.48	13.81	
1,295.00	1.80	212.90	1,294.44	-2.27	30.23	30.27	3.98	-0.96	118.09	
1,389.00	4.10	247.20	1,388.32	-4.82	26.33	26.41	2.98	2.45	36.49	
1,484.00	5.50	252.20	1,482.98	-7.53	18.86	18.99	1.54	1.47	5.26	
1,579.00	5.30	253.90	1,577.56	-10.13	10.31	10.49	0.27	-0.21	1.79	
1,673.00	6.80	263.60	1,671.04	-11.96	0.61	0.82	1.93	1.60	10.32	
1,767.00	6.10	262.20	1,764.44	-13.26	-9.87	-9.63	0.76	-0.74	-1.49	
1,862.00	5.50	260.60	1,858.96	-14.68	-19.36	-19.10	0.65	-0.63	-1.68	
1,956.00	4.60	262.10	1,952.59	-15.94	-27.54	-27.25	0.97	-0.96	1.60	
2,051.00	5.50	270.70	2,047.22	-16.41	-35.86	-35.57	1.24	0.95	9.05	
2,144.00	7.30	270.60	2,139.64	-16.29	-46.23	-45.93	1.94	1.94	-0.11	
2,239.00	6.90	270.40	2,233.91	-16.19	-57.97	-57.67	0.42	-0.42	-0.21	
2,334.00	5.90	270.30	2,328.32	-16.12	-68.56	-68.26	1.05	-1.05	-0.11	
2,429.00	6.60	267.90	2,422.75	-16.30	-78.90	-78.60	0.79	0.74	-2.53	
2,522.00	8.00	269.40	2,515.00	-16.56	-90.71	-90.40	1.52	1.51	1.61	
2,616.00	8.00	269.70	2,608.08	-16.66	-103.79	-103.48	0.04	0.00	0.32	
2,711.00	7.60	270.20	2,702.20	-16.68	-116.69	-116.37	0.43	-0.42	0.53	
2,805.00	7.30	270.30	2,795.41	-16.62	-128.87	-128.56	0.32	-0.32	0.11	
2,900.00	7.00	269.40	2,889.67	-16.65	-140.70	-140.38	0.34	-0.32	-0.95	
2,994.00	6.60	270.50	2,983.01	-16.66	-151.83	-151.51	0.45	-0.43	1.17	
3,089.00	6.20	266.00	3,077.42	-16.97	-162.40	-162.08	0.68	-0.42	-4.74	
3,183.00	5.70	257.30	3,170.91	-18.35	-172.02	-171.67	1.10	-0.53	-9.26	
3,278.00	5.70	257.40	3,265.44	-20.42	-181.23	-180.84	0.01	0.00	0.11	
3,371.00	6.80	260.50	3,357.89	-22.34	-191.17	-190.74	1.24	1.18	3.33	
3,466.00	7.00	262.00	3,452.20	-24.07	-202.45	-201.99	0.28	0.21	1.58	
3,560.00	6.80	261.10	3,545.52	-25.73	-213.62	-213.12	0.24	-0.21	-0.96	
3,655.00	6.40	262.30	3,639.89	-27.31	-224.42	-223.90	0.45	-0.42	1.26	
3,749.00	6.20	261.10	3,733.32	-28.80	-234.63	-234.08	0.25	-0.21	-1.28	
3,844.00	5.00	260.80	3,827.87	-30.25	-243.78	-243.20	1.26	-1.26	-0.32	
3,939.00	3.50	259.60	3,922.60	-31.44	-250.72	-250.12	1.58	-1.58	-1.26	
4,034.00	2.20	270.00	4,017.48	-31.96	-255.40	-254.79	1.47	-1.37	10.95	
4,128.00	1.00	25.30	4,111.46	-31.22	-256.85	-256.25	2.96	-1.28	122.66	
4,222.00	1.00	38.70	4,205.45	-29.84	-255.99	-255.42	0.25	0.00	14.26	



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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)
4,285.00	2.50	70.00	4,268.42	-28.94	-254.35	-253.80	2.74	2.38	49.68
4,317.00	5.00	76.00	4,300.35	-28.36	-252.34	-251.80	7.90	7.81	18.75
4,348.00	7.30	77.50	4,331.17	-27.61	-249.11	-248.58	7.44	7.42	4.84
4,378.00	9.80	75.90	4,360.83	-26.57	-244.77	-244.26	8.37	8.33	-5.33
4,409.00	12.40	74.10	4,391.25	-25.02	-239.01	-238.53	8.46	8.39	-5.81
4,443.00	16.10	75.30	4,424.20	-22.82	-230.94	-230.49	10.92	10.88	3.53
4,475.00	19.60	76.50	4,454.65	-20.44	-221.42	-221.02	11.00	10.94	3.75
4,507.00	22.30	81.90	4,484.54	-18.33	-210.19	-209.83	10.36	8.44	16.88
4,537.00	25.00	88.50	4,512.02	-17.37	-198.21	-197.87	12.59	9.00	22.00
4,570.00	28.40	93.70	4,541.50	-17.69	-183.41	-183.06	12.49	10.30	15.76
4,602.00	32.90	96.30	4,569.02	-19.13	-167.16	-166.80	14.66	14.06	8.13
4,634.00	37.00	96.50	4,595.25	-21.18	-148.95	-148.55	12.82	12.81	0.63
4,665.00	40.60	95.10	4,619.40	-23.13	-129.63	-129.20	11.95	11.61	-4.52
4,696.00	43.70	92.20	4,642.38	-24.44	-108.87	-108.42	11.81	10.00	-9.35
4,728.00	46.70	91.10	4,664.93	-25.09	-86.18	-85.72	9.69	9.38	-3.44
4,760.00	47.60	90.60	4,686.69	-25.44	-62.72	-62.26	3.04	2.81	-1.56
4,791.00	47.30	90.40	4,707.66	-25.64	-39.89	-39.42	1.08	-0.97	-0.65
4,823.00	46.90	90.00	4,729.44	-25.72	-16.44	-15.98	1.55	-1.25	-1.25
4,854.00	46.40	89.40	4,750.72	-25.60	6.10	6.55	2.14	-1.61	-1.94
4,885.00	45.80	89.20	4,772.21	-25.33	28.43	28.88	1.99	-1.94	-0.65
4,917.00	45.50	89.00	4,794.58	-24.97	51.31	51.75	1.04	-0.94	-0.63
4,948.00	48.30	89.60	4,815.76	-24.69	73.94	74.37	9.14	9.03	1.94
4,980.00	52.30	91.50	4,836.20	-24.94	98.56	98.98	13.31	12.50	5.94
5,011.00	55.40	93.50	4,854.49	-26.04	123.56	124.00	11.27	10.00	6.45
5,043.00	58.20	94.30	4,872.01	-27.87	150.27	150.74	9.00	8.75	2.50
5,074.00	61.90	93.30	4,887.48	-29.64	177.07	177.56	12.26	11.94	-3.23
5,106.00	66.60	91.40	4,901.38	-30.81	205.85	206.37	15.63	14.69	-5.94
5,138.00	70.80	89.70	4,913.00	-31.09	235.66	236.17	14.03	13.13	-5.31
5,169.00	74.20	89.10	4,922.32	-30.78	265.22	265.72	11.12	10.97	-1.94
5,201.00	76.50	89.90	4,930.42	-30.51	296.17	296.67	7.58	7.19	2.50
5,233.00	78.90	91.30	4,937.23	-30.84	327.43	327.93	8.63	7.50	4.38
5,265.00	81.30	92.30	4,942.73	-31.83	358.94	359.45	8.11	7.50	3.13
5,296.00	84.00	93.00	4,946.70	-33.26	389.65	390.18	8.99	8.71	2.26
5,327.00	87.10	92.00	4,949.11	-34.60	420.52	421.07	10.50	10.00	-3.23
5,359.00	89.70	90.90	4,950.00	-35.41	452.50	453.05	8.82	8.13	-3.44
5,454.00	90.40	90.80	4,949.92	-36.82	547.48	548.05	0.74	0.74	-0.11
5,549.00	90.20	91.60	4,949.42	-38.81	642.46	643.05	0.87	-0.21	0.84
5,644.00	89.10	90.90	4,950.00	-40.88	737.44	738.05	1.37	-1.16	-0.74
5,739.00	88.90	89.50	4,951.66	-41.22	832.42	833.02	1.49	-0.21	-1.47
5,834.00	89.50	89.20	4,952.98	-40.14	927.40	927.97	0.71	0.63	-0.32
5,929.00	90.50	89.10	4,952.98	-38.73	1,022.39	1,022.92	1.06	1.05	-0.11



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6,024.00	90.30	89.90	4,952.32	-37.90	1,117.38	1,117.88	0.87	-0.21	0.84
6,117.00	90.30	89.60	4,951.83	-37.49	1,210.38	1,210.86	0.32	0.00	-0.32
6,212.00	90.10	90.20	4,951.50	-37.33	1,305.38	1,305.84	0.67	-0.21	0.63
6,307.00	89.50	90.20	4,951.83	-37.66	1,400.38	1,400.83	0.63	-0.63	0.00
6,402.00	89.60	90.40	4,952.58	-38.16	1,495.37	1,495.82	0.24	0.11	0.21
6,497.00	90.50	91.40	4,952.50	-39.65	1,590.36	1,590.81	1.42	0.95	1.05
6,592.00	89.90	92.00	4,952.16	-42.47	1,685.32	1,685.81	0.89	-0.63	0.63
6,687.00	89.50	91.30	4,952.66	-45.20	1,780.28	1,780.80	0.85	-0.42	-0.74
6,782.00	89.00	90.10	4,953.91	-46.36	1,875.26	1,875.79	1.37	-0.53	-1.26
6,877.00	89.50	89.40	4,955.15	-45.95	1,970.25	1,970.75	0.91	0.53	-0.74
6,971.00	89.10	89.90	4,956.30	-45.37	2,064.24	2,064.72	0.68	-0.43	0.53
7,097.00	89.90	90.70	4,957.40	-46.03	2,190.23	2,190.70	0.90	0.63	0.63
7,191.00	90.30	90.60	4,957.23	-47.10	2,284.22	2,284.70	0.44	0.43	-0.11
7,286.00	90.80	89.70	4,956.32	-47.35	2,379.22	2,379.68	1.08	0.53	-0.95
7,381.00	90.30	89.40	4,955.41	-46.60	2,474.21	2,474.65	0.61	-0.53	-0.32
7,474.00	90.50	90.20	4,954.76	-46.28	2,567.21	2,567.62	0.89	0.22	0.86
7,568.00	91.60	91.30	4,953.04	-47.51	2,661.18	2,661.60	1.65	1.17	1.17
7,663.00	91.40	91.60	4,950.55	-49.91	2,756.12	2,756.57	0.38	-0.21	0.32
7,758.00	90.20	91.60	4,949.22	-52.56	2,851.07	2,851.55	1.26	-1.26	0.00
7,853.00	90.50	92.30	4,948.64	-55.80	2,946.01	2,946.54	0.80	0.32	0.74
7,948.00	90.70	91.50	4,947.65	-58.95	3,040.95	3,041.52	0.87	0.21	-0.84
8,043.00	90.40	91.90	4,946.74	-61.76	3,135.91	3,136.51	0.53	-0.32	0.42
8,137.00	89.80	91.00	4,946.57	-64.14	3,229.88	3,230.51	1.15	-0.64	-0.96
8,232.00	90.00	90.30	4,946.74	-65.22	3,324.87	3,325.50	0.77	0.21	-0.74
8,327.00	89.90	90.60	4,946.82	-65.97	3,419.87	3,420.50	0.33	-0.11	0.32
8,421.00	89.50	91.30	4,947.31	-67.53	3,513.85	3,514.50	0.86	-0.43	0.74
8,516.00	89.10	90.70	4,948.47	-69.18	3,608.83	3,609.49	0.76	-0.42	-0.63
8,611.00	90.10	91.50	4,949.14	-71.01	3,703.81	3,704.48	1.35	1.05	0.84
8,706.00	90.70	91.40	4,948.47	-73.41	3,798.77	3,799.48	0.64	0.63	-0.11
8,801.00	90.50	90.50	4,947.48	-74.99	3,893.75	3,894.47	0.97	-0.21	-0.95
8,895.00	90.40	90.90	4,946.74	-76.13	3,987.74	3,988.47	0.44	-0.11	0.43
8,991.00	90.00	91.30	4,946.41	-77.98	4,083.73	4,084.47	0.59	-0.42	0.42
9,086.00	90.20	92.20	4,946.24	-80.88	4,178.68	4,179.46	0.97	0.21	0.95
9,180.00	89.60	89.80	4,946.40	-82.52	4,272.66	4,273.45	2.63	-0.64	-2.55
9,273.00	90.00	89.20	4,946.73	-81.71	4,365.65	4,366.42	0.78	0.43	-0.65
9,367.00	89.80	89.30	4,946.89	-80.48	4,459.64	4,460.37	0.24	-0.21	0.11
9,461.00	89.40	90.00	4,947.55	-79.90	4,553.64	4,554.34	0.86	-0.43	0.74
9,556.00	89.10	90.60	4,948.79	-80.40	4,648.63	4,649.32	0.71	-0.32	0.63
9,650.00	89.70	91.00	4,949.78	-81.71	4,742.62	4,743.32	0.77	0.64	0.43
9,744.00	89.20	91.40	4,950.68	-83.68	4,836.59	4,837.31	0.68	-0.53	0.43
9,839.00	89.50	91.20	4,951.76	-85.84	4,931.56	4,932.31	0.38	0.32	-0.21



TDS
Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Site: McIntyre DK Federal Com #28H
Well: SHL: 465' FSL, 285' FWL, Sec 17, T17S, R30E, Unit M
Wellbore: BHL: 350' FSL, 590' FWL, Sec 16, T17S, R30E, Unit M
Design: BHL: 350' FSL, 590' FWL, Sec 16, T17S, R30E, Unit M

Local Co-ordinate Reference: Well SHL: 465' FSL, 285' FWL, Sec 17, T17S, R30E, Unit M
TVD Reference: KB @ 3664.00usft (Patriot 6)
MD Reference: KB @ 3664.00usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

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)	
9,934.00	90.50	91.00	4,951.76	-87.66	5,026.54	5,027.30	1.07	1.05	-0.21	
10,028.00	90.20	91.50	4,951.18	-89.71	5,120.52	5,121.30	0.62	-0.32	0.53	
10,123.00	90.50	90.60	4,950.60	-91.45	5,215.50	5,216.30	1.00	0.32	-0.95	
10,218.00	89.80	90.50	4,950.35	-92.36	5,310.49	5,311.29	0.74	-0.74	-0.11	
10,313.00	88.80	90.10	4,951.51	-92.86	5,405.48	5,406.28	1.13	-1.05	-0.42	
10,422.00	88.00	90.10	4,954.56	-93.05	5,514.44	5,515.22	0.73	-0.73	0.00	
Last TDS MWD Survey										
10,492.00	88.00	90.10	4,957.00	-93.17	5,584.40	5,585.17	0.00	0.00	0.00	
Projection to Bit/TD										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
1,030.00	1,029.69	-0.13	20.59	Tie-In to VES Gyro Survey	
1,138.00	1,137.56	-0.18	25.77	First TDS MWD Survey	
10,422.00	4,954.56	-93.05	5,514.44	Last TDS MWD Survey	
10,492.00	4,957.00	-93.17	5,584.40	Projection to Bit/TD	

Checked By: _____ Approved By: _____ Date: _____