



HOBBS OCD
MAY 01 2017
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COG Operating LLC

Lea County, NM (NAD-27 2015)

Flat Head Federal Com #17H

API #: 30-025-43224

SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A

PP: 983' FNL, 980' FEL, Sec 14, T17S, R32E, Unit A

BHL: 371' FNL, 964' FEL, Sec 11, T17S, R32E, Unit A

Design: BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A

Standard Survey Report

10 January, 2017



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4116.00usft (Silver Oak 3)
Site:	Flat Head Federal Com #17H	MD Reference:	KB @ 4116.00usft (Silver Oak 3)
Well:	SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A	Database:	EDM 5000.1 Single User Db

Project	Lea 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	Flat Head Federal Com #17H		
Site Position:		Northing:	669,253.50 usft
From:	Map	Easting:	684,765.80 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	32° 50' 18.304 N
		Longitude:	103° 43' 54.375 W
		Grid Convergence:	0.33 °

Well	SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A		
Well Position	+N/-S	0.00 usft	Northing: 669,253.50 usft
	+E/-W	0.00 usft	Easting: 684,765.80 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 50' 18.304 N
		Longitude:	103° 43' 54.375 W
		Ground Level:	4,098.00 usft

Wellbore	BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2015	12/12/2016	7.13
			Dip Angle (°) 60.61
			Field Strength (nT) 48,334

Design	BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.00	0.00	0.00
			Direction (°) 1.42

Survey Program	Date 1/10/2017		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
100.00	2,750.00	VES Gyro #1 (BHL: 350' FNL, 970' FEL, S	VES-ISCWSA-GYRO-3
2,750.00	11,847.00	TDS MWD #2 (BHL: 350' FNL, 970' FEL, S	MWD
			Description
			Biaxial Semi-Cont. Gyro
			MWD - Standard

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	0.71	329.11	100.00	0.53	-0.32	0.52	0.71	0.71	0.00
200.00	0.87	325.99	199.99	1.69	-1.06	1.67	0.17	0.16	-3.12
300.00	0.73	341.27	299.98	2.93	-1.69	2.88	0.25	-0.14	15.28
400.00	0.73	339.45	399.97	4.13	-2.12	4.07	0.02	0.00	-1.82
500.00	0.39	303.50	499.97	4.91	-2.63	4.84	0.47	-0.34	-35.95
600.00	0.35	304.32	599.96	5.27	-3.16	5.19	0.04	-0.04	0.82

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4116.00usft (Silver Oak 3)
Site:	Flat Head Federal Com #17H	MD Reference:	KB @ 4116.00usft (Silver Oak 3)
Well:	SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A	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	0.25	313.27	699.96	5.59	-3.57	5.50	0.11	-0.10	8.95	
800.00	0.25	277.06	799.96	5.77	-3.95	5.67	0.16	0.00	-36.21	
900.00	0.49	303.08	899.96	6.03	-4.52	5.91	0.29	0.24	26.02	
1,000.00	0.43	265.17	999.96	6.23	-5.26	6.10	0.30	-0.06	-37.91	
1,100.00	0.48	294.85	1,099.95	6.37	-6.01	6.22	0.24	0.05	29.68	
1,200.00	0.23	221.60	1,199.95	6.40	-6.52	6.24	0.47	-0.25	-73.25	
1,300.00	0.33	274.42	1,299.95	6.27	-6.94	6.10	0.26	0.10	52.82	
1,400.00	0.27	186.69	1,399.95	6.06	-7.26	5.88	0.42	-0.06	-87.73	
1,500.00	0.11	57.82	1,499.95	5.88	-7.20	5.70	0.35	-0.16	-128.87	
1,600.00	0.33	62.94	1,599.95	6.06	-6.87	5.89	0.22	0.22	5.12	
1,700.00	0.09	89.16	1,699.95	6.19	-6.53	6.03	0.25	-0.24	26.22	
1,800.00	0.53	64.31	1,799.95	6.39	-6.04	6.24	0.45	0.44	-24.85	
1,900.00	0.95	42.64	1,899.94	7.20	-5.06	7.08	0.50	0.42	-21.67	
2,000.00	1.26	47.01	1,999.92	8.56	-3.69	8.47	0.32	0.31	4.37	
2,100.00	1.49	53.39	2,099.89	10.09	-1.84	10.04	0.28	0.23	6.38	
2,200.00	1.62	46.40	2,199.85	11.84	0.22	11.84	0.23	0.13	-6.99	
2,300.00	1.51	52.24	2,299.82	13.62	2.29	13.67	0.19	-0.11	5.84	
2,400.00	1.43	61.73	2,399.78	15.02	4.43	15.12	0.26	-0.08	9.49	
2,500.00	1.18	61.14	2,499.76	16.11	6.43	16.26	0.25	-0.25	-0.59	
2,600.00	0.97	63.72	2,599.74	16.98	8.09	17.17	0.22	-0.21	2.58	
2,700.00	0.90	51.13	2,699.73	17.85	9.46	18.07	0.22	-0.07	-12.59	
2,750.00	1.03	58.72	2,749.72	18.32	10.15	18.57	0.36	0.26	15.18	
Tie-In to VES Gyro										
2,848.00	0.90	55.60	2,847.71	19.22	11.54	19.50	0.14	-0.13	-3.18	
First TDS MWD Survey										
2,911.00	1.70	106.20	2,910.69	19.24	12.84	19.55	2.10	1.27	80.32	
3,005.00	3.60	123.40	3,004.59	17.22	16.65	17.63	2.17	2.02	18.30	
3,100.00	3.50	124.70	3,099.40	13.93	21.52	14.46	0.14	-0.11	1.37	
3,194.00	4.90	127.70	3,193.15	9.84	27.06	10.51	1.51	1.49	3.19	
3,288.00	5.80	116.60	3,286.74	5.26	34.48	6.11	1.45	0.96	-11.81	
3,383.00	5.50	115.30	3,381.28	1.16	42.89	2.23	0.34	-0.32	-1.37	
3,477.00	5.30	116.80	3,474.86	-2.72	50.84	-1.46	0.26	-0.21	1.60	
3,572.00	6.20	115.60	3,569.38	-6.91	59.38	-5.44	0.96	0.95	-1.26	
3,666.00	5.80	116.20	3,662.87	-11.20	68.22	-9.51	0.43	-0.43	0.64	
3,761.00	6.20	122.70	3,757.35	-16.09	76.84	-14.19	0.83	0.42	6.84	
3,855.00	7.60	125.30	3,850.67	-22.43	86.19	-20.29	1.53	1.49	2.77	
3,950.00	7.50	126.90	3,944.84	-29.78	96.27	-27.39	0.25	-0.11	1.68	
4,044.00	7.40	127.20	4,038.05	-37.13	106.00	-34.49	0.11	-0.11	0.32	
4,138.00	7.40	127.80	4,131.27	-44.50	115.61	-41.62	0.08	0.00	0.64	
4,233.00	7.70	128.50	4,225.44	-52.21	125.42	-49.08	0.33	0.32	0.74	
4,327.00	8.00	129.70	4,318.56	-60.31	135.38	-56.93	0.36	0.32	1.28	

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Site:	Flat Head Federal Com #17H	MD Reference:	KB @ 4116.00usft (Silver Oak 3)
Well:	SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A	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)
4,422.00	8.30	138.00	4,412.61	-69.62	145.06	-66.01	1.28	0.32	8.74
4,516.00	6.10	131.50	4,505.86	-77.98	153.34	-74.15	2.49	-2.34	-6.91
4,611.00	6.10	132.40	4,600.32	-84.72	160.85	-80.71	0.10	0.00	0.95
4,705.00	4.40	124.10	4,693.93	-90.11	167.52	-85.94	1.98	-1.81	-8.83
4,799.00	4.40	126.40	4,787.65	-94.28	173.41	-89.95	0.19	0.00	2.45
4,894.00	4.30	130.60	4,882.38	-98.76	179.05	-94.29	0.35	-0.11	4.42
4,988.00	2.60	139.50	4,976.20	-102.67	183.11	-98.10	1.89	-1.81	9.47
5,082.00	1.00	131.30	5,070.15	-104.83	185.11	-100.21	1.72	-1.70	-8.72
5,177.00	0.40	350.50	5,165.15	-105.05	185.68	-100.42	1.40	-0.63	-148.21
5,272.00	0.70	352.40	5,260.14	-104.15	185.54	-99.52	0.32	0.32	2.00
5,303.00	2.60	359.10	5,291.13	-103.26	185.51	-98.63	6.15	6.13	21.61
5,335.00	5.60	358.10	5,323.05	-100.97	185.45	-96.35	9.38	9.38	-3.13
5,366.00	9.40	358.50	5,353.77	-96.93	185.33	-92.31	12.26	12.26	1.29
5,461.00	20.90	352.10	5,445.32	-72.31	182.79	-67.75	12.21	12.11	-6.74
5,492.00	23.40	352.60	5,474.03	-60.72	181.24	-56.21	8.09	8.06	1.61
5,524.00	25.80	353.40	5,503.13	-47.50	179.62	-43.04	7.57	7.50	2.50
5,555.00	29.10	355.30	5,530.63	-33.28	178.22	-28.86	11.01	10.65	6.13
5,587.00	32.80	357.10	5,558.07	-16.87	177.15	-12.47	11.92	11.56	5.63
5,618.00	36.10	358.40	5,583.63	0.65	176.47	5.03	10.91	10.65	4.19
5,650.00	39.30	359.80	5,608.95	20.22	176.17	24.58	10.35	10.00	4.38
5,681.00	42.40	0.50	5,632.40	40.49	176.22	44.84	10.11	10.00	2.26
5,712.00	44.70	0.60	5,654.86	61.85	176.43	66.20	7.42	7.42	0.32
5,744.00	45.50	0.60	5,677.45	84.51	176.67	88.86	2.50	2.50	0.00
5,775.00	45.90	0.60	5,699.10	106.70	176.90	111.05	1.29	1.29	0.00
5,807.00	46.10	0.60	5,721.33	129.71	177.14	134.06	0.63	0.63	0.00
5,838.00	45.90	0.90	5,742.87	152.01	177.43	156.36	0.95	-0.65	0.97
5,870.00	46.00	1.00	5,765.11	175.01	177.81	179.36	0.38	0.31	0.31
5,901.00	46.10	0.80	5,786.63	197.32	178.16	201.68	0.57	0.32	-0.65
5,913.29	47.10	0.76	5,795.07	206.25	178.29	210.61	8.13	8.12	-0.32
As-Drilled PP									
5,933.00	48.70	0.70	5,808.29	220.88	178.47	225.23	8.13	8.13	-0.31
5,964.00	51.70	1.40	5,828.13	244.68	178.91	249.04	9.83	9.68	2.26
5,996.00	55.00	0.90	5,847.23	270.35	179.42	274.71	10.39	10.31	-1.56
6,027.00	58.90	359.70	5,864.13	296.33	179.55	300.69	12.99	12.58	-3.87
6,059.00	61.70	359.00	5,879.98	324.12	179.24	328.46	8.95	8.75	-2.19
6,090.00	64.70	359.20	5,893.96	351.78	178.80	356.11	9.69	9.68	0.65
6,122.00	68.00	359.00	5,906.80	381.09	178.34	385.39	10.33	10.31	-0.63
6,153.00	71.80	358.60	5,917.45	410.19	177.73	414.47	12.32	12.26	-1.29
6,185.00	74.80	358.60	5,926.64	440.82	176.98	445.08	9.38	9.38	0.00
6,216.00	77.30	359.30	5,934.11	470.90	176.43	475.13	8.36	8.06	2.26
6,248.00	79.80	0.10	5,940.47	502.26	176.27	506.48	8.19	7.81	2.50

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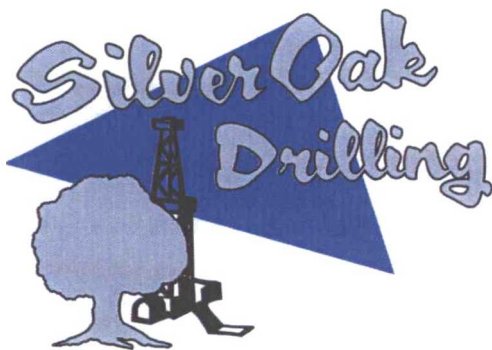
Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,279.00	83.30	0.20	5,945.02	532.92	176.35	537.13	11.29	11.29	0.32
6,311.00	87.40	359.60	5,947.61	564.81	176.29	569.00	12.95	12.81	-1.88
6,375.00	89.60	359.40	5,949.29	628.78	175.73	632.94	3.45	3.44	-0.31
6,470.00	89.70	359.80	5,949.87	723.78	175.07	727.89	0.43	0.11	0.42
6,564.00	89.50	359.90	5,950.53	817.77	174.83	821.86	0.24	-0.21	0.11
6,659.00	89.20	359.90	5,951.60	912.77	174.66	916.82	0.32	-0.32	0.00
6,753.00	89.40	0.30	5,952.75	1,006.76	174.82	1,010.78	0.48	0.21	0.43
6,847.00	89.00	0.20	5,954.06	1,100.75	175.23	1,104.75	0.44	-0.43	-0.11
6,942.00	90.30	0.50	5,954.65	1,195.74	175.81	1,199.73	1.40	1.37	0.32
7,036.00	90.00	0.60	5,954.40	1,289.74	176.72	1,293.72	0.34	-0.32	0.11
7,131.00	89.70	1.10	5,954.65	1,384.73	178.13	1,388.72	0.61	-0.32	0.53
7,225.00	89.40	1.20	5,955.39	1,478.71	180.01	1,482.71	0.34	-0.32	0.11
7,320.00	90.60	359.20	5,955.39	1,573.70	180.34	1,577.68	2.46	1.26	-2.11
7,414.00	90.10	358.50	5,954.81	1,667.68	178.46	1,671.59	0.92	-0.53	-0.74
7,508.00	89.70	358.30	5,954.98	1,761.64	175.83	1,765.46	0.48	-0.43	-0.21
7,603.00	90.50	359.90	5,954.81	1,856.62	174.34	1,860.37	1.88	0.84	1.68
7,697.00	89.90	359.80	5,954.48	1,950.62	174.09	1,954.34	0.65	-0.64	-0.11
7,791.00	89.80	0.10	5,954.73	2,044.62	174.01	2,048.31	0.34	-0.11	0.32
7,886.00	89.00	359.20	5,955.72	2,139.61	173.43	2,143.26	1.27	-0.84	-0.95
7,980.00	90.20	0.60	5,956.38	2,233.61	173.27	2,237.22	1.96	1.28	1.49
8,074.00	89.80	0.00	5,956.38	2,327.61	173.76	2,331.20	0.77	-0.43	-0.64
8,169.00	89.70	0.00	5,956.79	2,422.60	173.76	2,426.17	0.11	-0.11	0.00
8,263.00	89.50	0.10	5,957.45	2,516.60	173.84	2,520.14	0.24	-0.21	0.11
8,358.00	91.10	1.10	5,956.95	2,611.59	174.84	2,615.12	1.99	1.68	1.05
8,452.00	90.40	0.60	5,955.72	2,705.57	176.23	2,709.11	0.92	-0.74	-0.53
8,547.00	90.70	1.00	5,954.81	2,800.56	177.56	2,804.10	0.53	0.32	0.42
8,641.00	90.80	0.90	5,953.58	2,894.54	179.12	2,898.09	0.15	0.11	-0.11
8,736.00	89.50	359.30	5,953.33	2,989.53	179.28	2,993.06	2.17	-1.37	-1.68
8,830.00	89.10	358.90	5,954.48	3,083.51	177.81	3,086.97	0.60	-0.43	-0.43
8,925.00	90.80	359.90	5,954.56	3,178.50	176.81	3,181.91	2.08	1.79	1.05
9,020.00	91.10	359.90	5,952.99	3,273.49	176.64	3,276.86	0.32	0.32	0.00
9,114.00	91.20	0.20	5,951.10	3,367.47	176.73	3,370.82	0.34	0.11	0.32
9,208.00	90.00	359.10	5,950.12	3,461.46	176.15	3,464.76	1.73	-1.28	-1.17
9,303.00	90.50	0.00	5,949.70	3,556.46	175.41	3,559.71	1.08	0.53	0.95
9,398.00	89.50	359.40	5,949.70	3,651.45	174.91	3,654.67	1.23	-1.05	-0.63
9,492.00	89.40	359.20	5,950.60	3,745.44	173.76	3,748.60	0.24	-0.11	-0.21
9,586.00	89.20	359.10	5,951.75	3,839.42	172.37	3,842.52	0.24	-0.21	-0.11
9,681.00	89.40	359.40	5,952.91	3,934.41	171.12	3,937.44	0.38	0.21	0.32
9,775.00	89.50	359.60	5,953.82	4,028.40	170.30	4,031.38	0.24	0.11	0.21
9,870.00	89.40	359.90	5,954.73	4,123.39	169.89	4,126.34	0.33	-0.11	0.32
9,964.00	89.30	0.30	5,955.79	4,217.39	170.05	4,220.31	0.44	-0.11	0.43

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4116.00usft (Silver Oak 3)
Site:	Flat Head Federal Com #17H	MD Reference:	KB @ 4116.00usft (Silver Oak 3)
Well:	SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 970' FEL, Sec 11, T17S, R32E, Unit A	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)
10,059.00	89.90	359.20	5,956.46	4,312.38	169.64	4,315.26	1.32	0.63	-1.16
10,153.00	90.50	357.90	5,956.13	4,406.35	167.26	4,409.14	1.52	0.64	-1.38
10,248.00	90.10	357.70	5,955.63	4,501.28	163.61	4,503.95	0.47	-0.42	-0.21
10,342.00	90.50	358.40	5,955.14	4,595.22	160.41	4,597.79	0.86	0.43	0.74
10,437.00	90.50	358.90	5,954.31	4,690.19	158.18	4,692.67	0.53	0.00	0.53
10,531.00	90.50	359.30	5,953.49	4,784.18	156.70	4,786.59	0.43	0.00	0.43
10,626.00	90.40	359.80	5,952.74	4,879.17	155.95	4,881.54	0.54	-0.11	0.53
10,720.00	90.20	0.20	5,952.25	4,973.17	155.95	4,975.51	0.48	-0.21	0.43
10,815.00	90.20	0.30	5,951.92	5,068.17	156.37	5,070.49	0.11	0.00	0.11
10,909.00	89.80	0.20	5,951.92	5,162.17	156.78	5,164.47	0.44	-0.43	-0.11
11,003.00	89.70	0.40	5,952.33	5,256.16	157.27	5,258.45	0.24	-0.11	0.21
11,098.00	89.50	0.60	5,952.99	5,351.16	158.10	5,353.43	0.30	-0.21	0.21
11,192.00	90.90	0.40	5,952.67	5,445.15	158.92	5,447.42	1.50	1.49	-0.21
11,287.00	90.40	0.30	5,951.59	5,540.14	159.50	5,542.39	0.54	-0.53	-0.11
11,381.00	90.10	0.60	5,951.18	5,634.14	160.24	5,636.38	0.45	-0.32	0.32
11,476.00	90.20	359.20	5,950.93	5,729.14	160.07	5,731.34	1.48	0.11	-1.47
11,571.00	90.60	0.10	5,950.27	5,824.13	159.49	5,826.30	1.04	0.42	0.95
11,665.00	91.70	359.50	5,948.38	5,918.11	159.16	5,920.24	1.33	1.17	-0.64
11,760.00	91.40	359.50	5,945.81	6,013.07	158.34	6,015.15	0.32	-0.32	0.00
Last TDS MWD Survey									
11,847.00	91.40	359.50	5,943.68	6,100.04	157.58	6,102.07	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)	
2,750.00	2,749.72	18.32	10.15	Tie-In to VES Gyro
2,848.00	2,847.71	19.22	11.54	First TDS MWD Survey
5,913.29	5,795.07	206.25	178.29	As-Drilled PP
11,760.00	5,945.81	6,013.07	158.34	Last TDS MWD Survey
11,847.00	5,943.68	6,100.04	157.58	Projection to Bit/TD

Checked By: _____ Approved By: _____ Date: _____



PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288

January 12, 2017

COG, LLC
One Concho Center
600 W. Illinois Ave.
Midland, TX 79701

RE: Flat Head Fed Com 17H
1190' FNL & 1060' FEL
Sec. 14, T17S, R32E
Lea County, New Mexico

Dear Sir,

The attached is the Deviation Survey for the above captioned well.

Very truly yours,

A handwritten signature in black ink, appearing to read "Graham".

Chris Graham
Asst. Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 12th day of January, 2017.

A handwritten signature in black ink, appearing to read "Regina L. Garner".

Notary Public

FLAT HEAD FED COM #17 H

Date	Depth	Deviation	Direction
12/27/2016	231	0.80	0.00
12/27/2016	468	0.60	0.00
12/27/2016	739	0.70	0.00
12/27/2016	1089	2.80	0.00
12/28/2016	1112	0.30	0.00
12/29/2016	1587	0.10	0.00
12/30/2016	2057	0.50	0.00
12/30/2016	2530	1.70	0.00
1/1/2017	2843	0.90	55.60
1/1/2017	2911	1.70	106.20
1/1/2017	3005	3.60	123.40
1/1/2017	3100	3.50	124.70
1/1/2017	3194	4.90	127.70
1/1/2017	3288	5.80	116.60
1/1/2017	3383	5.50	115.30
1/1/2017	3477	5.30	116.80
1/2/2017	3572	6.20	115.60
1/2/2017	3666	5.80	116.20
1/2/2017	3761	6.20	122.70
1/2/2017	3855	7.60	125.30
1/2/2017	3950	7.50	126.90
1/2/2017	4044	7.40	127.20
1/2/2017	4138	7.40	127.80
1/2/2017	4233	7.70	128.50
1/2/2017	4327	8.00	129.70
1/2/2017	4422	8.30	138.00
1/2/2017	4516	6.10	131.50
1/3/2017	4705	4.40	124.10
1/3/2017	4794	4.40	126.40
1/3/2017	4894	4.40	130.60
1/3/2017	4988	2.60	139.50
1/3/2017	5082	1.00	131.30
1/3/2017	5177	0.40	350.50
1/3/2017	5272	0.70	352.40
1/3/2017	5303	2.60	359.10
1/3/2017	5335	5.60	358.10
1/3/2017	5461	20.90	352.10
1/3/2017	5492	23.40	325.60
1/3/2017	5524	25.80	353.40
1/3/2017	5555	29.10	355.30
1/3/2017	5587	32.80	357.10
1/3/2017	5618	36.10	358.40
1/3/2017	5650	39.30	359.80

Date	Depth	Deviation	Direction
1/4/2017	5744	45.50	0.60
1/4/2017	5838	45.90	0.90
1/4/2017	5933	48.70	0.70
1/4/2017	5964	51.70	1.40
1/4/2017	5996	55.00	0.90
1/4/2017	6059	61.70	359.00
1/4/2017	6090	64.70	359.20
1/4/2017	6185	74.80	358.60
1/4/2017	6248	79.80	0.10
1/4/2017	6279	83.30	0.20
1/4/2017	6311	87.40	359.60
1/5/2017	6375	89.60	359.40
1/5/2017	6470	89.70	359.80
1/5/2017	6564	89.50	359.90
1/5/2017	6659	89.20	359.90
1/5/2017	6753	89.40	0.30
1/5/2017	6847	89.00	0.20
1/5/2017	6942	90.30	0.50
1/5/2017	7036	90.00	0.60
1/5/2017	7131	89.70	1.10
1/5/2017	7225	89.40	1.20
1/6/2017	7320	90.60	359.20
1/6/2017	7414	90.10	358.50
1/6/2017	7508	89.70	358.30
1/6/2017	7603	90.50	359.90
1/6/2017	7697	89.90	359.80
1/6/2017	7791	89.80	0.10
1/6/2017	7886	89.00	359.20
1/6/2017	7980	90.20	0.60
1/6/2017	8169	89.70	0.00
1/6/2017	8263	89.50	0.10
1/6/2017	8358	91.10	1.10
1/6/2017	8452	90.40	0.60
1/6/2017	8547	90.70	1.00
1/7/2017	8641	90.80	0.90
1/7/2017	8736	89.50	359.30
1/7/2017	8830	89.10	358.90
1/7/2017	8925	90.80	359.90
1/7/2017	9020	91.10	359.90
1/7/2017	9114	91.20	0.20
1/7/2017	9208	90.00	359.10
1/7/2017	9303	90.50	0.00
1/7/2017	9398	89.50	359.40
1/7/2017	9492	89.40	359.20
1/7/2017	9586	89.20	359.10

Date	Depth	Deviation	Direction
1/7/2017	9681	89.40	359.40
1/7/2017	9775	89.50	359.60
1/7/2017	9870	89.40	359.90
1/8/2017	9964	89.30	0.30
1/8/2017	10059	89.90	359.20
1/8/2017	10153	90.50	357.90
1/8/2017	10248	90.10	357.70
1/8/2017	10342	90.50	358.40
1/8/2017	10437	90.50	358.40
1/8/2017	10531	90.50	359.30
1/8/2017	10626	90.40	359.80
1/8/2017	10720	90.20	0.20
1/9/2017	10815	90.20	0.30
1/9/2017	10909	89.80	0.20
1/9/2017	11003	89.70	0.40
1/9/2017	11098	89.50	0.60
1/9/2017	11192	90.90	0.40
1/9/2017	11287	90.40	0.30
1/9/2017	11381	90.10	0.60
1/9/2017	11476	90.20	359.20
1/9/2017	11571	90.60	0.10
1/9/2017	11665	91.70	359.50
1/9/2017	11760	91.40	359.50

EOF

January 6, 2017

Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

RE: Flat Head Federal Com No 017H

Please find enclosed a copy of the survey from 0' to 2750' ran on the above referenced well.

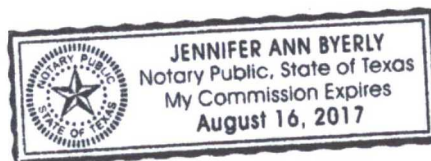
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 6th day of January,
A.D., 2016, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas



Company: COG OPERATING
Lease/Well: FLAT HEAD FEDERAL COM No/017H



Rig Name: SILVER OAK 3
State/County: NEW MEXICO/LEA
VS-Azi: 0.00 Degrees
Latitude: 32.83910, Longitude: -103.73594
Grid North = True North -0.32 degs (NAD 27)
Grid Correction Applied = -0.32 degs



Depth Reference : RKB 18 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: eline-de_01.ut
Minimum Curvature Method
Report Date/Time: 1/6/2017 / 08:17

VES Survey International
West Texas
432-563-5444

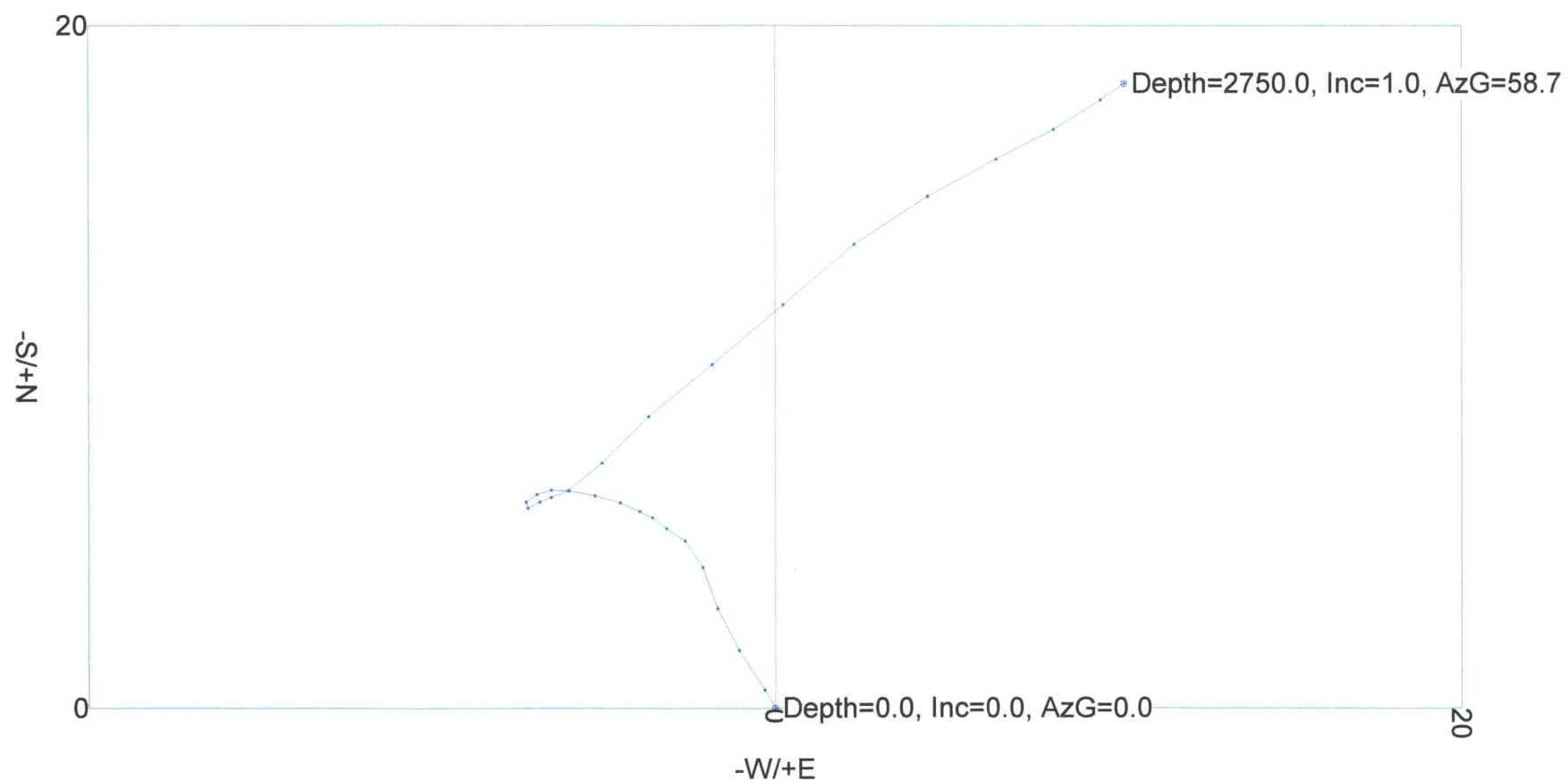
Surveyor: Dustin Byers
Flat Head Federal Com No 017H / API 30-025-43224

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.71	329.11	100.00	0.53	-0.32	0.53	0.62	329.11	0.71
200.00	0.87	325.99	199.99	1.69	-1.06	1.69	2.00	327.93	0.16
300.00	0.73	341.27	299.98	2.93	-1.69	2.93	3.38	330.00	0.25
400.00	0.73	339.45	399.97	4.13	-2.12	4.13	4.64	332.83	0.02
500.00	0.39	303.50	499.97	4.91	-2.63	4.91	5.57	331.87	0.47
600.00	0.35	304.32	599.96	5.27	-3.16	5.27	6.15	329.04	0.04
700.00	0.25	313.27	699.96	5.60	-3.58	5.60	6.64	327.42	0.11
800.00	0.25	277.06	799.96	5.77	-3.95	5.77	7.00	325.62	0.16
900.00	0.49	303.08	899.96	6.03	-4.52	6.03	7.54	323.15	0.29
1000.00	0.43	265.17	999.96	6.23	-5.25	6.23	8.15	319.88	0.30
1100.00	0.48	294.85	1099.95	6.38	-6.01	6.38	8.76	316.72	0.24
1200.00	0.23	221.60	1199.95	6.40	-6.52	6.40	9.14	314.47	0.47
1300.00	0.33	274.42	1299.95	6.27	-6.94	6.27	9.35	312.09	0.26
1400.00	0.27	186.69	1399.95	6.05	-7.25	6.05	9.45	309.85	0.42
1500.00	0.11	57.82	1499.95	5.87	-7.20	5.87	9.29	309.19	0.36
1600.00	0.33	62.94	1599.95	6.05	-6.86	6.05	9.15	311.42	0.22

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1700.00	0.09	89.16	1699.95	6.18	-6.52	6.18	8.99	313.47	0.25
1800.00	0.53	64.31	1799.95	6.39	-6.03	6.39	8.78	316.66	0.45
1900.00	0.95	42.64	1899.94	7.20	-5.05	7.20	8.79	324.95	0.49
2000.00	1.26	47.01	1999.92	8.55	-3.69	8.55	9.31	336.67	0.32
2100.00	1.49	53.39	2099.89	10.07	-1.84	10.07	10.24	349.63	0.28
2200.00	1.62	46.40	2199.85	11.82	0.22	11.82	11.83	1.09	0.23
2300.00	1.51	52.24	2299.82	13.60	2.29	13.60	13.80	9.55	0.20
2400.00	1.43	61.73	2399.78	15.00	4.43	15.00	15.64	16.46	0.25
2500.00	1.18	61.14	2499.76	16.09	6.44	16.09	17.34	21.81	0.25
2600.00	0.97	63.72	2599.74	16.97	8.10	16.97	18.80	25.52	0.22
2700.00	0.90	51.13	2699.73	17.83	9.47	17.83	20.19	27.97	0.22
2750.00	1.03	58.72	2749.72	18.31	10.16	18.31	20.94	29.02	0.36



VES Survey International
West Texas
432-563-5444
Surveyor: Dustin Byers
Flat Head Federal Com No 017H / API 30-025-43224





I Dustin Byers certify that I am employed by VES Survey International. That I did on the day(s) of 12/31/16 through 12/31/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,750.00 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of COG Operating for the Flat Head Fed Com Well # 17H API # 30-025-43224 in Lea County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by VES Survey International.

A handwritten signature in blue ink, appearing to read "Dustin Byers", is written over a horizontal line.

Dustin Byers
Service Technician
VES Survey International