



COG Operating LLC

Lea County, NM (NAD-27 2015)

Flat Head Federal Com #15H

API #: 30-025-43157

SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B

PP: 978' FNL, 2292' FEL, Sec 14, T17S, R32E, Unit B

BHL: 370' FNL, 2292' FEL, Sec 11, T17S, R32E, Unit B

Design: BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B

Standard Survey Report

03 January, 2017





TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4108.00usft (Patriot 6)
Site:	Flat Head Federal Com #15H	MD Reference:	KB @ 4108.00usft (Patriot 6)
Well:	SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B	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 #15H		
Site Position:		Northing:	669,493.40 usft
From:	Map	Easting:	663,484.20 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	32° 50' 20.749 N
		Longitude:	103° 44' 9.380 W
		Grid Convergence:	0.32 °

Well	SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B		
Well Position	+N-S	0.00 usft	Northing: 669,493.40 usft
	+E-W	0.00 usft	Easting: 663,484.20 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 50' 20.749 N
		Longitude:	103° 44' 9.380 W
		Ground Level:	4,088.00 usft

Wellbore	BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B		
Magnetics	Model Name	Sample Date	Declination
	IGRF2015	11/29/2016	7.14
			Dip Angle
			60.61
			Field Strength
			48,337

Design	BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N-S	+E-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			1.11

Survey Program	Date 1/3/2017		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	2,770.00	VES Gyro #1 (BHL: 350' FNL, 2290' FEL,	VES-ISCWSA-GYRO-3
2,770.00	11,825.00	TDS MWD #2 (BHL: 350' FNL, 2290' FEL,	MWD
			Description
			Biaxial Semi-Cont. Gyro
			MWD - Standard

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.62	85.07	100.00	0.05	0.54	0.08	0.62	0.62	0.00
200.00	0.63	84.66	199.99	0.14	1.63	0.18	0.01	0.01	-0.41
300.00	0.83	73.56	299.98	0.40	2.87	0.46	0.24	0.20	-11.10
400.00	0.28	96.18	399.98	0.58	3.81	0.65	0.58	-0.55	22.62
500.00	0.26	107.30	499.98	0.49	4.26	0.57	0.06	-0.02	11.12
600.00	0.04	150.03	599.98	0.39	4.50	0.47	0.23	-0.22	42.73



TDS
Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Site: Flat Head Federal Com #15H
Well: SHL: 940' FNL, 2440' FEL Sec 14, T17S, R32E, Unit B
Wellbore: BHL: 350' FNL, 2290' FEL Sec 11, T17S, R32E, Unit B
Design: BHL: 350' FNL, 2290' FEL Sec 11, T17S, R32E, Unit B

Local Co-ordinate Reference: Well SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B
TVD Reference: KB @ 4106.00usft (Patriot 6)
MD Reference: KB @ 4106.00usft (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	0.20	250.32	699.98	0.30	4.35	0.38	0.21	0.16	100.29
800.00	0.44	272.36	799.98	0.26	3.80	0.33	0.27	0.24	22.04
900.00	0.38	271.60	899.97	0.28	3.09	0.34	0.06	-0.06	-0.76
1,000.00	0.45	248.87	999.97	0.15	2.39	0.19	0.16	0.07	-22.73
1,100.00	0.54	222.49	1,099.97	-0.34	1.71	-0.31	0.24	0.09	-26.38
1,200.00	0.15	186.18	1,199.97	-0.82	1.37	-0.79	0.43	-0.39	-36.31
1,300.00	0.07	75.97	1,299.96	-0.93	1.42	-0.91	0.19	-0.08	-110.21
1,400.00	0.16	59.50	1,399.96	-0.85	1.60	-0.82	0.09	0.09	-16.47
1,500.00	0.51	48.45	1,499.96	-0.48	2.05	-0.44	0.35	0.35	-11.05
1,600.00	0.61	36.28	1,599.96	0.24	2.70	0.29	0.15	0.10	-12.17
1,700.00	0.70	37.40	1,699.95	1.16	3.39	1.22	0.09	0.09	1.12
1,800.00	1.25	25.54	1,799.94	2.63	4.23	2.71	0.58	0.55	-11.86
1,900.00	1.26	42.81	1,899.91	4.42	5.44	4.52	0.38	0.01	17.27
2,000.00	1.50	43.38	1,999.88	6.17	7.09	6.31	0.24	0.24	0.57
2,100.00	1.73	41.94	2,099.84	8.25	9.00	8.42	0.23	0.23	-1.44
2,200.00	1.48	48.47	2,199.81	10.23	10.97	10.44	0.31	-0.25	6.53
2,300.00	1.36	57.44	2,299.77	11.72	12.94	11.97	0.25	-0.12	8.97
2,400.00	1.39	52.61	2,399.75	13.10	14.91	13.38	0.12	0.03	-4.83
2,500.00	1.04	52.28	2,499.72	14.39	16.59	14.71	0.35	-0.35	-0.33
2,600.00	0.55	19.01	2,599.71	15.40	17.46	15.73	0.65	-0.49	-33.27
2,700.00	0.32	23.25	2,699.71	16.11	17.73	16.45	0.23	-0.23	4.24
2,770.00	0.46	37.44	2,769.71	16.51	17.98	16.86	0.24	0.20	20.27
Tie-In to VES Gyro									
2,913.00	0.10	322.40	2,912.71	17.07	18.25	17.42	0.31	-0.25	-52.48
First TDS MWD Survey									
3,006.00	1.80	131.20	3,005.69	16.17	19.30	16.54	2.04	1.83	181.51
3,101.00	2.40	128.70	3,100.63	13.94	21.97	14.36	0.64	0.63	-2.63
3,196.00	3.70	125.80	3,195.49	10.91	26.01	11.41	1.38	1.37	-3.05
3,290.00	7.80	135.90	3,289.00	4.55	32.91	5.16	4.48	4.36	10.74
3,384.00	11.00	148.10	3,381.74	-7.65	42.09	-6.84	3.99	3.40	12.98
3,479.00	13.20	161.10	3,474.64	-25.61	50.40	-24.64	3.67	2.32	13.68
3,573.00	13.90	164.80	3,566.02	-46.66	56.84	-45.56	1.18	0.74	3.94
3,668.00	14.10	165.00	3,658.20	-68.85	62.82	-67.63	0.22	0.21	0.21
3,763.00	15.90	172.90	3,749.97	-92.95	67.43	-91.63	2.86	1.89	8.32
3,858.00	14.40	169.10	3,841.67	-117.48	71.27	-116.07	1.89	-1.58	-4.00
3,953.00	15.00	159.80	3,933.57	-140.60	77.75	-139.08	2.56	0.63	-9.79
4,048.00	14.40	160.50	4,025.46	-163.28	85.94	-161.59	0.66	-0.63	0.74
4,143.00	15.40	158.00	4,117.27	-186.11	94.61	-184.25	1.25	1.05	-2.63
4,238.00	15.40	157.50	4,208.85	-209.46	104.16	-207.41	0.14	0.00	-0.53
4,333.00	15.00	157.60	4,300.53	-232.48	113.67	-230.24	0.42	-0.42	0.11
4,428.00	13.90	165.50	4,392.53	-254.89	121.22	-252.51	2.37	-1.16	8.32



TDS
Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Site: Flat Head Federal Com #15H
Well: SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B
Wellbore: BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B
Design: BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B

Local Co-ordinate Reference: Well SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B
TVD Reference: KB @ 4106.00usft (Patriot 6)
MD Reference: KB @ 4106.00usft (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)
4,522.00	12.30	168.50	4,484.09	-275.64	126.04	-273.15	1.85	-1.70	3.19
4,616.00	11.20	165.20	4,576.11	-294.28	130.37	-291.71	1.37	-1.17	-3.51
4,710.00	9.60	167.80	4,688.57	-310.76	134.36	-308.11	1.77	-1.70	2.77
4,804.00	7.70	170.90	4,761.50	-324.65	137.01	-321.94	2.08	-2.02	3.30
4,898.00	5.00	180.90	4,854.91	-334.96	137.94	-332.24	3.09	-2.87	10.64
4,993.00	2.50	184.10	4,949.70	-341.17	137.73	-338.45	2.64	-2.63	3.37
5,086.00	1.10	231.00	5,042.66	-343.75	136.89	-341.05	2.07	-1.51	50.43
5,179.00	1.50	257.70	5,135.63	-344.57	135.00	-341.91	0.77	0.43	28.71
5,242.00	1.80	300.80	5,198.61	-344.24	133.35	-341.61	1.97	0.48	68.41
5,274.00	3.90	329.00	5,230.57	-343.05	132.36	-340.44	7.70	6.56	88.13
5,305.00	8.60	340.00	5,261.44	-340.48	131.20	-337.88	9.26	8.71	35.48
5,337.00	9.60	344.80	5,293.12	-336.17	129.88	-333.80	9.60	9.38	15.00
5,368.00	12.40	348.50	5,323.54	-330.41	128.53	-327.87	9.31	9.03	11.94
5,399.00	15.10	350.90	5,353.65	-323.16	127.23	-320.65	8.90	8.71	7.74
5,430.00	18.20	355.20	5,383.35	-314.35	126.19	-311.86	10.75	10.00	13.67
5,461.00	21.80	358.10	5,412.48	-303.77	125.59	-301.29	12.04	11.61	9.35
5,492.00	25.50	359.60	5,440.67	-291.34	125.35	-288.87	12.09	11.94	4.84
5,522.00	29.10	2.30	5,467.52	-277.59	125.60	-275.11	12.69	12.00	9.06
5,554.00	32.70	4.70	5,494.98	-261.19	126.62	-258.70	11.89	11.25	7.50
5,586.00	35.60	4.80	5,521.46	-243.29	128.11	-240.77	9.06	9.06	0.31
5,617.00	38.80	3.90	5,546.15	-224.61	129.53	-222.06	10.47	10.32	-2.90
5,648.00	42.20	3.10	5,570.48	-203.86	130.79	-201.30	10.75	10.63	-2.50
5,680.00	45.50	4.10	5,592.83	-182.43	132.14	-179.85	10.88	10.65	3.23
5,711.00	45.60	6.40	5,614.54	-160.40	134.17	-157.78	5.31	0.32	7.42
5,742.00	45.00	6.70	5,638.35	-138.51	136.68	-135.85	2.05	-1.94	0.97
5,774.00	44.70	6.40	5,659.03	-118.09	139.26	-113.38	1.15	-0.94	-0.94
5,805.00	44.10	6.30	5,681.18	-94.53	141.66	-91.78	1.95	-1.94	-0.32
5,837.00	43.90	6.30	5,704.20	-72.44	144.09	-69.64	0.63	-0.63	0.00
5,868.00	43.50	6.50	5,726.61	-51.15	146.48	-48.32	1.37	-1.29	0.65
5,886.34	44.41	5.51	5,739.81	-38.49	147.81	-35.63	6.23	4.98	-5.38
As-Drilled PP									
5,900.00	45.10	4.80	5,749.51	-28.92	148.68	-26.04	6.23	5.02	-5.23
5,931.00	48.70	3.10	5,770.69	-6.34	150.23	-3.44	12.28	11.61	-5.48
5,963.00	52.30	2.10	5,791.04	18.32	151.34	21.24	11.51	11.25	-3.13
5,994.00	56.00	1.30	5,809.20	43.43	152.08	46.36	12.12	11.94	-2.58
6,025.00	59.40	359.80	5,825.76	69.63	152.33	72.56	11.71	10.97	-4.84
6,057.00	62.90	358.40	5,841.20	97.65	151.88	100.56	11.59	10.94	-4.38
6,088.00	66.50	357.80	5,854.44	125.66	150.95	128.55	11.74	11.61	-1.94
6,120.00	69.80	357.80	5,866.35	155.33	149.81	158.19	10.31	10.31	0.00
6,151.00	72.80	358.40	5,876.29	184.88	148.84	187.51	9.85	9.88	1.94
6,182.00	76.10	358.90	5,884.60	214.53	148.14	217.35	10.76	10.65	1.61

Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Site: Flat Head Federal Com #15H
Well: SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B
Wellbore: BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B
Design: BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B

Local Co-ordinate Reference: Well SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B
TVD Reference: KB @ 4106.00usft (Patriot 6)
MD Reference: KB @ 4106.00usft (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)
6,214.00	79.20	359.30	5,891.44	245.78	147.64	248.58	9.76	9.69	1.25
6,246.00	81.60	359.50	5,896.78	277.33	147.31	280.12	7.53	7.50	0.63
6,276.00	84.20	359.30	5,900.49	307.09	147.00	309.87	8.69	8.67	-0.67
6,308.00	86.80	358.90	5,903.00	338.99	146.50	341.75	8.22	8.13	-1.25
6,339.00	88.50	358.70	5,904.27	369.96	145.85	372.70	5.52	5.48	-0.65
6,371.00	88.60	358.80	5,905.08	401.94	145.16	404.66	0.44	0.31	0.31
6,402.00	89.70	358.90	5,905.54	432.93	144.53	435.64	3.56	3.55	0.32
6,434.00	90.20	358.60	5,905.57	464.92	143.83	467.61	1.82	1.56	-0.94
6,465.00	90.90	357.70	5,905.27	495.90	142.83	498.57	3.68	2.26	-2.90
6,527.00	91.10	358.60	5,904.19	557.86	140.83	560.47	1.49	0.32	1.45
6,621.00	91.20	359.20	5,902.30	651.82	139.03	654.38	0.65	0.11	0.64
6,715.00	90.90	359.00	5,900.58	745.79	137.55	748.31	0.38	-0.32	-0.21
6,810.00	89.80	0.10	5,900.00	840.79	136.81	843.27	1.64	-1.16	1.16
6,905.00	89.80	1.40	5,900.33	935.78	138.05	938.27	1.37	0.00	1.37
7,000.00	89.50	1.40	5,900.91	1,030.75	140.37	1,033.26	0.32	-0.32	0.00
7,095.00	90.30	0.90	5,901.08	1,125.73	142.28	1,128.26	0.99	0.84	-0.53
7,189.00	90.30	0.00	5,900.58	1,219.72	143.02	1,222.25	0.96	0.00	-0.96
7,283.00	90.40	0.00	5,900.01	1,313.72	143.02	1,316.23	0.11	0.11	0.00
7,378.00	90.20	0.20	5,899.51	1,408.72	143.18	1,411.22	0.30	-0.21	0.21
7,472.00	90.10	0.40	5,899.27	1,502.72	143.67	1,505.21	0.24	-0.11	0.21
7,566.00	90.10	359.40	5,899.10	1,596.71	143.51	1,599.19	1.06	0.00	-1.06
7,660.00	90.00	0.10	5,899.02	1,690.71	143.10	1,693.16	0.75	-0.11	0.74
7,755.00	90.30	359.40	5,898.77	1,785.71	142.69	1,788.13	0.80	0.32	-0.74
7,850.00	89.40	358.50	5,899.02	1,880.69	140.94	1,883.06	1.34	-0.95	-0.95
7,945.00	89.30	358.80	5,900.10	1,975.66	138.71	1,977.97	0.33	-0.11	0.32
8,040.00	89.20	359.20	5,901.34	2,070.64	137.05	2,072.90	0.43	-0.11	0.42
8,134.00	88.90	358.80	5,902.90	2,164.61	135.41	2,166.82	0.53	-0.32	-0.43
8,229.00	89.70	359.70	5,904.06	2,259.59	134.16	2,261.76	1.27	0.84	0.95
8,323.00	90.60	359.70	5,903.81	2,353.59	133.67	2,355.73	0.96	0.96	0.00
8,418.00	90.30	0.00	5,903.07	2,448.59	133.42	2,450.71	0.45	-0.32	0.32
8,513.00	90.20	0.00	5,902.65	2,543.59	133.42	2,545.69	0.11	-0.11	0.00
8,608.00	89.90	0.20	5,902.57	2,638.59	133.59	2,640.67	0.38	-0.32	0.21
8,702.00	89.70	0.40	5,902.90	2,732.58	134.08	2,734.66	0.30	-0.21	0.21
8,797.00	90.30	359.80	5,902.90	2,827.58	134.25	2,829.65	0.89	0.63	-0.83
8,891.00	90.40	0.10	5,902.32	2,921.58	134.17	2,923.63	0.34	0.11	0.32
8,986.00	90.20	359.80	5,901.83	3,016.58	134.08	3,018.60	0.38	-0.21	-0.32
9,080.00	90.60	358.40	5,901.17	3,110.58	132.61	3,112.54	1.55	0.43	-1.49
9,175.00	90.60	358.60	5,900.18	3,205.52	130.12	3,207.44	0.21	0.00	0.21
9,270.00	90.00	358.90	5,899.68	3,300.50	128.05	3,302.38	0.71	-0.63	0.32
9,365.00	89.50	359.00	5,900.09	3,395.48	126.31	3,397.29	0.54	-0.53	0.11
9,459.00	89.70	359.70	5,900.75	3,489.47	125.24	3,491.24	0.77	0.21	0.74

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4106.00usft (Patriot 6)
Site:	Flat Head Federal Corn #15H	MD Reference:	KB @ 4106.00usft (Patriot 6)
Well:	SHL: 940' FNL, 2440' FEL, Sec 14, T17S, R32E, Unit B	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 2290' FEL, Sec 11, T17S, R32E, Unit B	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)
9,554.00	89.50	0.00	5,901.41	3,584.47	124.99	3,586.22	0.38	-0.21	0.32
9,649.00	89.30	0.20	5,902.41	3,679.47	125.16	3,681.20	0.30	-0.21	0.21
9,744.00	90.20	0.30	5,902.82	3,774.46	125.57	3,776.18	0.95	0.95	0.11
9,839.00	90.10	0.70	5,902.57	3,869.46	126.40	3,871.16	0.43	-0.11	0.42
9,932.00	90.40	359.40	5,902.17	3,962.46	126.48	3,964.16	1.43	0.32	-1.40
10,027.00	90.50	359.80	5,901.42	4,057.45	125.82	4,059.12	0.43	0.11	0.42
10,122.00	90.90	359.80	5,900.26	4,152.44	125.49	4,154.09	0.42	0.42	0.00
10,216.00	90.90	358.90	5,898.78	4,246.42	124.42	4,248.03	0.96	0.00	-0.96
10,311.00	91.10	359.30	5,897.13	4,341.40	122.93	4,342.98	0.47	0.21	0.42
10,405.00	91.50	359.90	5,894.99	4,435.37	122.27	4,436.90	0.77	0.43	0.64
10,498.00	90.00	359.70	5,893.78	4,528.36	121.95	4,529.87	1.63	-1.61	-0.22
10,592.00	89.80	358.90	5,893.94	4,622.35	120.80	4,623.82	0.88	-0.21	-0.85
10,687.00	90.20	359.70	5,893.94	4,717.34	119.84	4,718.77	0.94	0.42	0.84
10,781.00	89.50	359.20	5,894.19	4,811.34	118.74	4,812.73	0.92	-0.74	-0.53
10,875.00	89.60	359.50	5,894.92	4,905.33	117.67	4,906.89	0.34	0.11	0.32
10,970.00	88.90	359.70	5,896.17	5,000.32	117.01	5,001.64	0.77	-0.74	0.21
11,065.00	89.00	359.10	5,897.91	5,095.30	116.01	5,096.59	0.64	0.11	-0.63
11,160.00	88.60	359.40	5,899.90	5,190.27	114.77	5,191.51	0.53	-0.42	0.32
11,254.00	89.90	0.70	5,901.13	5,284.25	114.85	5,285.49	1.96	1.38	1.38
11,349.00	90.30	0.00	5,900.96	5,379.25	115.43	5,380.48	0.85	0.42	-0.74
11,444.00	90.30	0.60	5,900.46	5,474.25	115.93	5,475.47	0.63	0.00	0.63
11,539.00	89.60	358.10	5,900.63	5,569.23	114.85	5,570.41	2.76	-0.84	-2.63
11,633.00	90.50	359.60	5,900.63	5,663.21	112.97	5,664.34	1.92	1.06	1.60
11,727.00	89.80	359.60	5,900.38	5,757.21	112.31	5,758.30	0.74	-0.74	0.00
11,771.00	89.70	359.80	5,900.58	5,801.21	112.08	5,802.29	0.51	-0.23	0.45
Last TDS MWD Survey									
11,825.00	89.70	359.80	5,900.86	5,855.21	111.89	5,856.27	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)	
2,770.00	2,769.71	16.51	17.98	Tie-In to VES Gyro
2,913.00	2,912.71	17.07	18.25	First TDS MWD Survey
5,896.34	5,739.81	-38.49	147.81	As-Drilled PP
11,771.00	5,900.58	5,801.21	112.08	Last TDS MWD Survey
11,825.00	5,900.86	5,855.21	111.89	Projection to Bit/TD

Checked By: _____ Approved By: _____ Date: _____



1/2/17

State of New Mexico
County of Eddy

I, Donald D. Mason, certify that: I am employed by Terra Directional Services LLC; that I did on the day(s) of 10/20/2016 through 10/29/2016 conduct or supervise the taking of a MWD survey from a depth of 1065 feet to a depth of 9680 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Terra Directional Services LLC; that I am authorized and qualified to make this report; that this survey was conducted at the request of COG Operating LLC for the Dodd Federal Unit #921H Well API 30-015-42995 in Eddy County, New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Terra Directional Services LLC.

Donald D. Mason
President

State of Texas
County of Burnet

Before me, a notary public, on this day personally appeared Donald D. Mason, known to me to be the person whose name is subscribed to the foregoing document and, being by me first duly sworn, declared that the statements therein contained are true and correct.



Notary Public's Signature

1250 N.E. Loop 410, Suite 500

San Antonio, Texas 78209

(210) 569-7129



December 22, 2016

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

Attn: Kanicia Castillo

RE: Flat Head Federal Com No 015H

Please find enclosed a copy of the survey from 0' to 2770' ran on the above referenced well.

Sincerely,

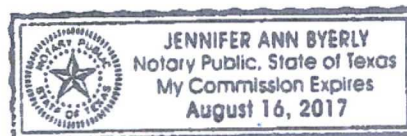
Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 22nd day of
December, A.D., 2016, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas

VES Survey International
P.O. Box 261021, Corpus Christi, Texas 78426
T (361) 767-0602 F (361) 767-0612
www.vessurvey.com





Company: COG Operating
Lease/Well: Flat Head Federal Com No./015H

Rig Name: Patriot 6
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 Foot

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey-de_01.ut

Minimum Curvature Method

Report Date/Time: 12/22/2016 / 15:46

VES Survey International

Midland Tx

(432) 583-5444

Surveyor: Gene Heiss

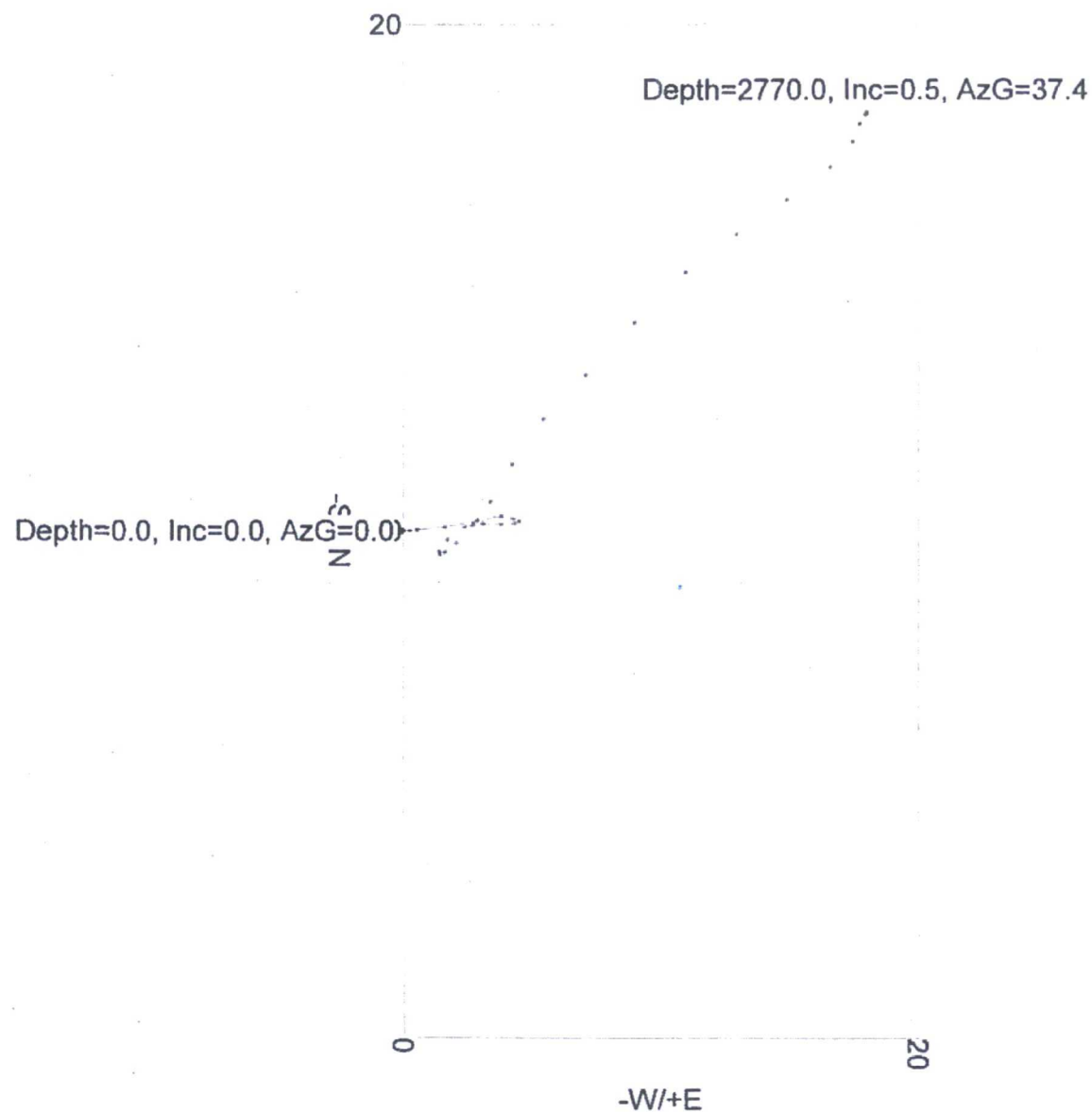
Flat Head Federal No Com 015H / API 30-025-43157

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	0.62	85.07	100.00	0.05	0.54	0.05	0.54	85.07	0.62
200.00	0.63	84.66	199.99	0.14	1.62	0.14	1.63	84.93	0.02
300.00	0.83	73.56	299.98	0.40	2.87	0.40	2.90	82.05	0.24
400.00	0.28	96.18	399.98	0.58	3.81	0.58	3.85	81.35	0.58
500.00	0.26	107.30	499.98	0.49	4.27	0.49	4.30	83.52	0.06
600.00	0.04	150.03	599.98	0.39	4.51	0.39	4.52	85.07	0.24
700.00	0.20	250.32	699.98	0.30	4.36	0.30	4.37	86.05	0.21
800.00	0.44	272.36	799.98	0.26	3.81	0.26	3.82	86.14	0.26
900.00	0.38	271.60	899.97	0.28	3.10	0.28	3.11	84.80	0.06
1000.00	0.45	248.87	999.97	0.15	2.40	0.15	2.40	86.46	0.18
1100.00	0.54	222.49	1099.97	-0.34	1.71	-0.34	1.75	101.18	0.24
1200.00	0.15	186.18	1199.97	-0.81	1.38	-0.81	1.60	120.35	0.43
1300.00	0.07	75.97	1299.96	-0.92	1.43	-0.92	1.70	122.77	0.18
1400.00	0.16	59.50	1399.96	-0.84	1.81	-0.84	1.82	117.36	0.09
1500.00	0.51	48.45	1499.96	-0.47	2.07	-0.47	2.12	102.80	0.35
1600.00	0.61	36.28	1599.96	0.25	2.71	0.25	2.72	84.72	0.15

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	0.70	37.40	1699.95	1.16	3.39	1.16	3.59	71.14	0.09
1800.00	1.25	25.54	1799.94	2.62	4.23	2.62	4.98	58.20	0.58
1900.00	1.26	42.81	1899.91	4.41	5.45	4.41	7.01	50.99	0.38
2000.00	1.50	43.38	1999.88	6.17	7.10	6.17	9.40	48.99	0.23
2100.00	1.73	41.94	2099.84	8.24	9.00	8.24	12.20	47.52	0.23
2200.00	1.48	48.47	2199.81	10.22	10.97	10.22	14.99	47.04	0.30
2300.00	1.36	57.44	2299.77	11.71	12.94	11.71	17.45	47.85	0.26
2400.00	1.39	52.61	2399.75	13.08	14.90	13.08	19.83	48.71	0.12
2500.00	1.04	52.28	2499.72	14.38	16.58	14.38	21.94	49.07	0.34
2600.00	0.55	19.01	2599.71	15.39	17.46	15.39	23.27	48.60	0.66
2700.00	0.32	23.25	2699.71	16.10	17.72	16.10	23.94	47.75	0.23
2770.00	0.46	37.44	2769.71	16.50	17.97	16.50	24.39	47.44	0.24



VES Survey International
Midland Tx
(432) 563-5444
Surveyor: Gene Heiss
Flat Head Federal No Com 015H / API 30-025-43157



VES Survey Date: 12/18/2016



I Gene Heiss certify that I am employed by VES Survey International. That I did on the day(s) of 12/18/16 through 12/18/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,770.00 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 Federal Com Well # 15H API # 30-025-43157 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 dark ink, appearing to read "Gene Heiss", is written over a horizontal line.

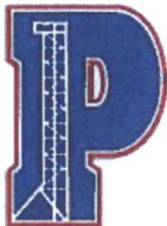
Gene Heiss
Service Technician
VES Survey International



I Gene Heiss certify that I am employed by VES Survey International. That I did on the day(s) of 12/18/16 through 12/18/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,770.00 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 Federal Com Well # 15H API # 30-025-43157 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 dark ink, appearing to read "Gene Heiss", is written over a horizontal line.

Gene Heiss
Service Technician
VES Survey International



PATRIOT DRILLING, LLC

OPERATOR: COG Operating, LLC
WELL/LEASE: Flat Head Federal Com # 15 H
COUNTY: Lea County, New Mexico
Sec.11 & 14, T17S, R32E

**STATE OF NEW MEXICO
DEVIATION REPORT**

<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
250	3/4	2,364	1 1/2
1,062	1/4	2,913	1/4
1,880	1	3,006	2

Patriot Drilling, LLC

M. Leroy Peterson, Executive Vice-
President

The foregoing instrument was acknowledged before me on this 5th day of January, 2017 by M. Leroy Peterson, Executive Vice-President of Patriot Drilling, LLC.

My Commission Expires: 02/01/2019

Lori T. Rowan
Notary Public for Ector Co., Texas

