



PATRIOT DRILLING, LLC

OPERATOR: COG Operating, LLC
WELL/LEASE: Ragnar Federal Com # 26H
COUNTY: Lea County New Mexico
Section 15, T17S, R32E

**STATE OF NEW MEXICO
DEVIATION REPORT**

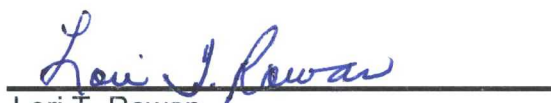
<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
288	1/2	1,254	3/4
809	1/4	1,506	1 1/2
1,001	1/2	1,916	1 1/4

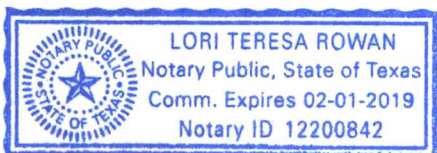
Patriot Drilling, LLC


M. Leroy Peterson, Executive Vice-
President

The foregoing instrument was acknowledged before me on this 11th day of February, 2017 by M. Leroy Peterson, Executive Vice-President of Patriot Drilling,

My Commission Expires: 02/01/2019
ID Number 12200842


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





COG Operating LLC

Lea County, NM (NAD-27 2015)

Ragnar Federal Com #26H

API #: 30-025-43273

SHL: 120' FNL, 1730' FEL, Sec 22, T17S, R32E, Unit B

PP: 330' FSL, 1673' FEL, Sec 15, T17S, R32E, Unit O

BHL: 221' FNL, 1660' FEL, Sec 15, T17S, R32E, Unit B

Design: BHL: 220' FNL, 1667' FEL, Sec 15, T17S, R32E, Unit B

Standard Survey Report

13 February, 2017

HOBBS OCD

MAY 30 2017

RECEIVED



4017/4034/4035

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 120' FNL, 1730' FEL, Sec 22, T17S, R32E, Unit B
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4035.00usft (Patriot 6)
Site:	Ragnar Federal Com #26H	MD Reference:	KB @ 4035.00usft (Patriot 6)
Well:	SHL: 120' FNL, 1730' FEL, Sec 22, T17S, R32E, Unit B	North Reference:	Grid
Wellbore:	BHL: 220' FNL, 1667' FEL, Sec 15, T17S, R32E, Unit B	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 220' FNL, 1667' FEL, Sec 15, 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		Ragnar Federal Com #26H			
Site Position:		Northing:	665,029.10 usft	Latitude:	32° 49' 36.826 N
From:	Map	Easting:	678,942.00 usft	Longitude:	103° 45' 2.905 W
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	0.32 °

Well	SHL: 120' FNL, 1730' FEL, Sec 22, T17S, R32E, Unit B					
Well Position	+N/-S	0.00 usft	Northing:	665,029.10 usft	Latitude:	32° 49' 36.826 N
	+E/-W	0.00 usft	Easting:	678,942.00 usft	Longitude:	103° 45' 2.905 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,017.00 usft

Wellbore	BHL: 220' FNL, 1667' FEL, Sec 15, T17S, R32E, Unit B				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	5/16/2016	7.20	60.60	48,385

Design	BHL: 220' FNL, 1667' FEL, Sec 15, T17S, R32E, Unit B				
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	0.34	

Survey Program	Date 2/13/2017				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,139.00	VES Gyro #1 (BHL: 220' FNL, 1667' FEL,	VES-ISCWSA-GYRO-3	Biaxial Semi-Cont. Gyro	
2,215.00	11,469.00	TDS MWD #2 (BHL: 220' FNL, 1667' FEL,	MWD	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	0.40	203.28	100.00	-0.32	-0.14	-0.32	0.40	0.40	0.00	
200.00	0.42	200.35	200.00	-0.98	-0.40	-0.99	0.03	0.02	-2.93	
300.00	0.48	192.07	299.99	-1.74	-0.62	-1.74	0.09	0.06	-8.28	
400.00	0.28	163.63	399.99	-2.38	-0.64	-2.39	0.27	-0.20	-28.44	
500.00	0.23	200.75	499.99	-2.80	-0.64	-2.81	0.17	-0.05	37.12	
600.00	0.16	274.26	599.99	-2.98	-0.85	-2.99	0.24	-0.07	73.51	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 120' FNL, 1730' FEL, Sec 22, T17S, R32E, Unit B
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4035.00usft (Patriot 6)
Site:	Ragnar Federal Com #26H	MD Reference:	KB @ 4035.00usft (Patriot 6)
Well:	SHL: 120' FNL, 1730' FEL, Sec 22, T17S, R32E, Unit B	North Reference:	Grid
Wellbore:	BHL: 220' FNL, 1667' FEL, Sec 15, T17S, R32E, Unit B	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 220' FNL, 1667' FEL, Sec 15, 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)	
700.00	0.14	273.49	699.99	-2.96	-1.11	-2.97	0.02	-0.02	-0.77	
800.00	0.16	298.37	799.99	-2.89	-1.36	-2.90	0.07	0.02	24.88	
900.00	0.15	315.82	899.99	-2.73	-1.57	-2.74	0.05	-0.01	17.45	
1,000.00	0.16	328.51	999.99	-2.52	-1.73	-2.53	0.04	0.01	12.69	
1,100.00	0.07	325.73	1,099.99	-2.35	-1.84	-2.36	0.09	-0.09	-2.78	
1,200.00	0.48	359.97	1,199.99	-1.88	-1.88	-1.89	0.42	0.41	34.24	
1,300.00	0.72	355.04	1,299.98	-0.83	-1.93	-0.84	0.25	0.24	-4.93	
1,400.00	0.75	355.97	1,399.97	0.45	-2.03	0.43	0.03	0.03	0.93	
1,500.00	0.88	6.18	1,499.96	1.86	-1.99	1.85	0.19	0.13	10.21	
1,600.00	1.05	13.64	1,599.95	3.52	-1.70	3.51	0.21	0.17	7.46	
1,700.00	0.97	21.94	1,699.93	5.19	-1.16	5.18	0.17	-0.08	8.30	
1,800.00	1.17	44.93	1,799.92	6.70	-0.13	6.70	0.47	0.20	22.99	
1,900.00	0.88	53.08	1,899.90	7.88	1.21	7.89	0.32	-0.29	8.15	
2,000.00	1.15	59.39	1,999.88	8.86	2.69	8.87	0.29	0.27	6.31	
2,100.00	1.16	70.83	2,099.86	9.70	4.51	9.73	0.23	0.01	11.44	
2,139.00	1.12	76.29	2,138.86	9.92	5.25	9.95	0.30	-0.10	14.00	
Tie-In to VES Gyro										
2,215.00	1.10	88.50	2,214.84	10.11	6.70	10.15	0.31	-0.03	16.07	
First TDS MWD Survey										
2,247.00	1.00	93.50	2,246.84	10.11	7.29	10.15	0.42	-0.31	15.63	
2,342.00	1.50	162.40	2,341.82	8.87	8.49	8.92	1.55	0.53	72.53	
2,437.00	3.60	160.50	2,436.72	4.87	9.86	4.93	2.21	2.21	-2.00	
2,532.00	4.00	159.60	2,531.51	-1.05	12.01	-0.97	0.43	0.42	-0.95	
2,627.00	3.40	162.10	2,626.31	-6.83	14.03	-6.75	0.65	-0.63	2.63	
2,722.00	3.80	160.90	2,721.12	-12.49	15.93	-12.39	0.43	0.42	-1.26	
2,816.00	4.40	167.80	2,814.88	-18.95	17.71	-18.85	0.83	0.64	7.34	
2,911.00	4.00	173.20	2,909.63	-25.81	18.87	-25.69	0.59	-0.42	5.68	
3,006.00	3.10	172.70	3,004.45	-31.64	19.59	-31.53	0.95	-0.95	-0.53	
3,101.00	4.00	178.80	3,099.26	-37.51	19.99	-37.39	1.03	0.95	6.42	
3,195.00	5.10	173.50	3,192.97	-44.93	20.53	-44.81	1.25	1.17	-5.64	
3,290.00	4.30	170.10	3,287.65	-52.64	21.62	-52.51	0.89	-0.84	-3.58	
3,384.00	3.80	173.80	3,381.41	-59.21	22.56	-59.07	0.60	-0.53	3.94	
3,479.00	5.20	169.70	3,476.12	-66.57	23.67	-66.43	1.51	1.47	-4.32	
3,574.00	5.40	166.10	3,570.71	-75.15	25.51	-74.99	0.41	0.21	-3.79	
3,669.00	5.30	168.20	3,665.30	-83.78	27.49	-83.62	0.23	-0.11	2.21	
3,764.00	4.00	181.90	3,759.98	-91.39	28.27	-91.22	1.79	-1.37	14.42	
3,858.00	3.60	172.60	3,853.78	-97.59	28.54	-97.42	0.78	-0.43	-9.89	
3,953.00	3.30	167.10	3,948.61	-103.22	29.54	-103.04	0.47	-0.32	-5.79	
4,047.00	3.40	163.30	4,042.45	-108.52	30.94	-108.34	0.26	0.11	-4.04	
4,142.00	3.50	152.80	4,137.27	-113.80	33.08	-113.60	0.67	0.11	-11.05	
4,236.00	3.00	155.30	4,231.12	-118.59	35.42	-118.37	0.55	-0.53	2.66	

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Survey									
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4,330.00	4.80	161.50	4,324.90	-124.55	37.69	-124.33	1.96	1.91	6.60
4,425.00	4.90	160.20	4,419.56	-132.14	40.33	-131.90	0.16	0.11	-1.37
4,519.00	4.30	164.90	4,513.26	-139.32	42.61	-139.06	0.75	-0.64	5.00
4,614.00	4.30	168.90	4,607.99	-146.25	44.22	-145.99	0.32	0.00	4.21
4,709.00	4.00	169.70	4,702.74	-153.01	45.50	-152.73	0.32	-0.32	0.84
4,802.00	3.80	174.90	4,795.53	-159.27	46.35	-158.99	0.44	-0.22	5.59
4,898.00	5.10	160.40	4,891.24	-166.46	48.07	-166.17	1.78	1.35	-15.10
4,991.00	5.10	160.10	4,983.87	-174.24	50.86	-173.93	0.03	0.00	-0.32
5,085.00	5.00	164.70	5,077.51	-182.12	53.36	-181.80	0.44	-0.11	4.89
5,181.00	4.90	164.40	5,173.15	-190.10	55.57	-189.77	0.11	-0.10	-0.31
5,276.00	4.20	170.20	5,267.85	-197.44	57.25	-197.09	0.88	-0.74	6.11
5,370.00	2.70	179.80	5,361.68	-203.04	57.85	-202.70	1.70	-1.60	10.21
5,464.00	1.30	163.90	5,455.62	-206.28	58.15	-205.93	1.59	-1.49	-16.91
5,558.00	0.70	88.70	5,549.61	-207.29	59.02	-206.94	1.39	-0.64	-80.00
5,652.00	0.60	53.80	5,643.60	-206.99	59.99	-206.63	0.43	-0.11	-37.13
5,683.00	0.70	44.40	5,674.60	-206.76	60.26	-206.40	0.47	0.32	-30.32
5,714.00	2.40	6.70	5,705.59	-205.98	60.46	-205.62	6.11	5.48	-121.61
5,745.00	5.50	1.40	5,736.51	-203.85	60.58	-203.48	10.06	10.00	-17.10
5,776.00	9.00	1.10	5,767.26	-199.94	60.66	-199.57	11.29	11.29	-0.97
5,807.00	12.50	359.60	5,797.71	-194.16	60.68	-193.79	11.33	11.29	-4.84
5,839.00	15.60	359.00	5,828.75	-186.39	60.58	-186.03	9.70	9.69	-1.88
5,870.00	18.50	359.10	5,858.38	-177.30	60.43	-176.94	9.36	9.35	0.32
5,902.00	21.30	359.00	5,888.47	-166.41	60.25	-166.05	8.75	8.75	-0.31
5,933.00	23.90	358.70	5,917.08	-154.50	60.01	-154.14	8.40	8.39	-0.97
5,964.00	26.50	358.20	5,945.13	-141.31	59.65	-140.95	8.42	8.39	-1.61
5,995.00	29.20	357.90	5,972.54	-126.84	59.16	-126.48	8.72	8.71	-0.97
6,027.00	32.30	358.00	6,000.04	-110.49	58.57	-110.14	9.69	9.69	0.31
6,058.00	36.10	358.40	6,025.67	-93.08	58.03	-92.73	12.28	12.26	1.29
6,090.00	39.30	358.60	6,050.99	-73.52	57.52	-73.17	10.01	10.00	0.63
6,121.00	42.00	358.00	6,074.50	-53.33	56.92	-52.99	8.80	8.71	-1.94
6,153.00	44.00	357.60	6,097.91	-31.53	56.08	-31.19	6.31	6.25	-1.25
6,184.00	44.70	357.50	6,120.07	-9.88	55.15	-9.55	2.27	2.26	-0.32
6,216.00	44.60	357.80	6,142.84	12.59	54.23	12.92	0.73	-0.31	0.94
6,247.00	44.40	357.60	6,164.95	34.30	53.36	34.62	0.79	-0.65	-0.65
6,279.00	44.20	358.20	6,187.85	56.64	52.54	56.95	1.45	-0.63	1.88
6,311.00	44.10	358.10	6,210.81	78.92	51.82	79.22	0.38	-0.31	-0.31
6,342.00	45.10	358.40	6,232.89	100.67	51.15	100.97	3.30	3.23	0.97
6,374.00	47.80	359.10	6,254.93	123.86	50.65	124.16	8.59	8.44	2.19
6,405.00	50.40	359.30	6,275.23	147.28	50.32	147.58	8.40	8.39	0.65
6,437.00	53.80	359.20	6,294.88	172.53	49.99	172.82	10.63	10.63	-0.31
6,468.00	57.10	359.60	6,312.46	198.06	49.73	198.35	10.70	10.65	1.29

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6,499.00	60.30	0.30	6,328.56	224.54	49.71	224.83	10.50	10.32	2.26
6,531.00	63.60	0.40	6,343.61	252.78	49.88	253.07	10.32	10.31	0.31
6,560.00	66.80	359.90	6,355.77	279.10	49.95	279.39	11.14	11.03	-1.72
6,592.00	69.90	359.50	6,367.58	308.84	49.79	309.13	9.76	9.69	-1.25
6,623.00	72.90	0.60	6,377.46	338.22	49.82	338.50	10.24	9.68	3.55
6,655.00	75.60	2.00	6,386.15	369.00	50.52	369.30	9.43	8.44	4.38
6,686.00	78.80	2.80	6,393.02	399.20	51.79	399.50	10.62	10.32	2.58
6,718.00	82.00	3.10	6,398.35	430.71	53.41	431.02	10.04	10.00	0.94
6,737.67	84.09	3.29	6,400.73	450.20	54.50	450.52	10.69	10.65	0.97
As-Drilled PP									
6,749.00	85.30	3.40	6,401.78	461.46	55.16	461.78	10.69	10.65	0.96
6,781.00	88.70	3.10	6,403.45	493.36	56.97	493.69	10.67	10.63	-0.94
6,812.00	90.60	2.20	6,403.64	524.33	58.40	524.66	6.78	6.13	-2.90
6,843.00	90.70	0.70	6,403.29	555.31	59.19	555.66	4.85	0.32	-4.84
6,907.00	91.00	358.40	6,402.34	619.30	58.68	619.64	3.62	0.47	-3.59
7,001.00	90.90	358.70	6,400.78	713.26	56.30	713.58	0.34	-0.11	0.32
7,095.00	90.70	359.00	6,399.47	807.23	54.42	807.54	0.38	-0.21	0.32
7,190.00	90.50	359.20	6,398.48	902.21	52.93	902.51	0.30	-0.21	0.21
7,284.00	90.20	359.10	6,397.90	996.20	51.53	996.49	0.34	-0.32	-0.11
7,379.00	90.40	359.90	6,397.40	1,091.19	50.70	1,091.48	0.87	0.21	0.84
7,475.00	89.80	0.20	6,397.24	1,187.19	50.79	1,187.47	0.70	-0.63	0.31
7,569.00	89.90	0.60	6,397.48	1,281.19	51.44	1,281.47	0.44	0.11	0.43
7,665.00	89.40	0.30	6,398.07	1,377.19	52.20	1,377.47	0.61	-0.52	-0.31
7,760.00	89.50	359.70	6,398.98	1,472.18	52.20	1,472.46	0.64	0.11	-0.63
7,855.00	89.80	0.30	6,399.56	1,567.18	52.20	1,567.46	0.71	0.32	0.63
7,950.00	89.50	359.00	6,400.14	1,662.17	51.62	1,662.45	1.40	-0.32	-1.37
8,045.00	89.90	359.00	6,400.64	1,757.16	49.96	1,757.42	0.42	0.42	0.00
8,141.00	89.80	358.60	6,400.89	1,853.14	47.95	1,853.39	0.43	-0.10	-0.42
8,236.00	89.30	359.80	6,401.64	1,948.12	46.62	1,948.36	1.37	-0.53	1.26
8,330.00	89.60	0.30	6,402.54	2,042.12	46.70	2,042.36	0.62	0.32	0.53
8,425.00	89.60	359.60	6,403.20	2,137.11	46.62	2,137.35	0.74	0.00	-0.74
8,520.00	89.60	359.90	6,403.87	2,232.11	46.21	2,232.35	0.32	0.00	0.32
8,616.00	90.10	358.80	6,404.12	2,328.10	45.12	2,328.33	1.26	0.52	-1.15
8,710.00	90.20	358.90	6,403.87	2,422.08	43.23	2,422.30	0.15	0.11	0.11
8,804.00	90.80	359.40	6,403.05	2,516.07	41.84	2,516.27	0.83	0.64	0.53
8,898.00	90.70	0.10	6,401.82	2,610.06	41.43	2,610.26	0.75	-0.11	0.74
8,994.00	90.20	0.60	6,401.07	2,706.05	42.01	2,706.25	0.74	-0.52	0.52
9,088.00	91.00	359.30	6,400.08	2,800.05	41.93	2,800.24	1.62	0.85	-1.38
9,182.00	90.90	359.50	6,398.52	2,894.03	40.95	2,894.22	0.24	-0.11	0.21
9,276.00	91.00	0.70	6,396.96	2,988.01	41.11	2,988.20	1.28	0.11	1.28
9,371.00	90.10	359.80	6,396.05	3,083.01	41.53	3,083.20	1.34	-0.95	-0.95

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 120' FNL, 1730' FEL, Sec 22, T17S, R32E, Unit B
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4035.00usft (Patriot 6)
Site:	Ragnar Federal Com #26H	MD Reference:	KB @ 4035.00usft (Patriot 6)
Well:	SHL: 120' FNL, 1730' FEL, Sec 22, T17S, R32E, Unit B	North Reference:	Grid
Wellbore:	BHL: 220' FNL, 1667' FEL, Sec 15, T17S, R32E, Unit B	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 220' FNL, 1667' FEL, Sec 15, 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)
9,465.00	90.00	358.70	6,395.97	3,177.00	40.29	3,177.18	1.18	-0.11	-1.17
9,560.00	89.50	359.20	6,396.39	3,271.98	38.55	3,272.15	0.74	-0.53	0.53
9,654.00	89.20	359.70	6,397.45	3,365.97	37.65	3,366.13	0.62	-0.32	0.53
9,748.00	88.90	359.80	6,399.01	3,459.95	37.24	3,460.11	0.34	-0.32	0.11
9,843.00	90.10	359.80	6,399.84	3,554.95	36.91	3,555.10	1.26	1.26	0.00
9,938.00	90.00	0.00	6,399.76	3,649.95	36.74	3,650.10	0.24	-0.11	0.21
10,032.00	89.80	0.10	6,399.92	3,743.95	36.83	3,744.10	0.24	-0.21	0.11
10,127.00	89.30	0.30	6,400.67	3,838.94	37.16	3,839.10	0.57	-0.53	0.21
10,221.00	89.30	0.30	6,401.81	3,932.93	37.65	3,933.09	0.00	0.00	0.00
10,316.00	90.10	359.50	6,402.31	4,027.93	37.48	4,028.08	1.19	0.84	-0.84
10,411.00	89.80	359.40	6,402.40	4,122.93	36.57	4,123.07	0.33	-0.32	-0.11
10,506.00	89.80	359.70	6,402.73	4,217.92	35.83	4,218.06	0.32	0.00	0.32
10,600.00	89.90	0.20	6,402.97	4,311.92	35.74	4,312.06	0.54	0.11	0.53
10,694.00	89.80	0.20	6,403.22	4,405.92	36.07	4,406.06	0.11	-0.11	0.00
10,788.00	89.90	0.10	6,403.47	4,499.92	36.32	4,500.06	0.15	0.11	-0.11
10,881.00	89.80	0.60	6,403.71	4,592.92	36.89	4,593.06	0.55	-0.11	0.54
10,974.00	89.10	1.10	6,404.60	4,685.90	38.27	4,686.05	0.92	-0.75	0.54
11,068.00	90.00	0.10	6,405.34	4,779.89	39.25	4,780.04	1.43	0.96	-1.06
11,162.00	90.60	359.50	6,404.85	4,873.89	38.92	4,874.04	0.90	0.64	-0.64
11,256.00	89.90	359.90	6,404.44	4,967.89	38.43	4,968.03	0.86	-0.74	0.43
11,350.00	89.20	359.90	6,405.18	5,061.88	38.27	5,062.02	0.74	-0.74	0.00
11,413.00	88.70	359.90	6,406.33	5,124.87	38.16	5,125.01	0.79	-0.79	0.00
Last TDS MWD Survey									
11,469.00	88.70	359.90	6,407.60	5,180.86	38.06	5,180.99	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)	
2,139.00	2,138.86	9.92	5.25	Tie-In to VES Gyro
2,215.00	2,214.84	10.11	6.70	First TDS MWD Survey
6,737.67	6,400.73	450.20	54.50	As-Drilled PP
11,413.00	6,406.33	5,124.87	38.16	Last TDS MWD Survey
11,469.00	6,407.60	5,180.86	38.06	Projection to Bit/TD

Checked By: _____ Approved By: _____ Date: _____



4/29/17

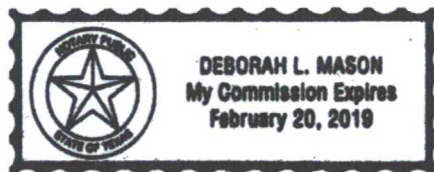
State of New Mexico
County of Lea

I, Donald D. Mason, certify that: I am employed by Terra Directional Services LLC; that I did on the day(s) of 01/30/2017 through 02/11/2017 conduct or supervise the taking of a MWD survey from a depth of 2215 feet to a depth of 11469 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 Ragnar Federal Com #26H Well API 30-025-43273 in Lea 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

PO Box 56087

Houston, Texas 77256

(210) 419-1700

February 2, 2017

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

Attn: Kanicia Castillo

RE: **Ragnar Federal Com No. 026H**

Please find enclosed a copy of the survey from 0' to 2139' ran on the above referenced well.

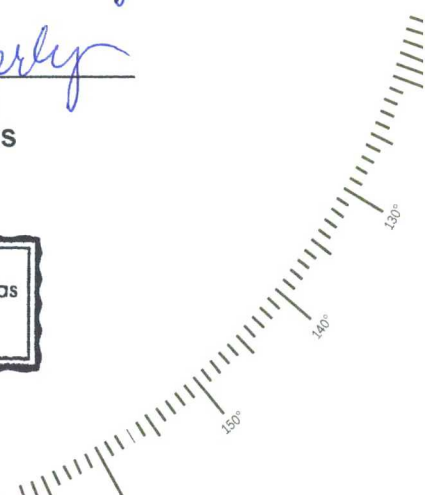
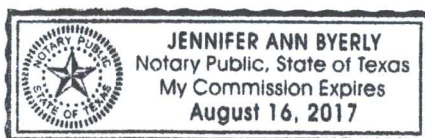
Sincerely,


Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 2nd day of February,
A.D., 2017, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: COG Operating LLC
Lease/Well: Ragnar Federal Com No./026H

Rig Name: Patriot 6
State/County: New Mexico/Lea
VS-Azi: 0.00 Degrees
Latitude: 32.82690, Longitude: -103.75081
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: 2/2/2017 / 10:00

VES Survey International
Midland Tx
(432) 563-5444
Surveyor: Gene Heiss
Ragnar Federal Com No. 026H / API 30-025-43273

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	0.40	203.28	100.00	-0.32	-0.14	-0.32	0.35	203.28	0.40
200.00	0.42	200.35	200.00	-0.98	-0.40	-0.98	1.06	202.28	0.03
300.00	0.48	192.07	299.99	-1.72	-0.61	-1.72	1.83	199.59	0.09
400.00	0.28	163.63	399.99	-2.37	-0.63	-2.37	2.45	194.92	0.26
500.00	0.23	200.75	499.99	-2.79	-0.63	-2.79	2.86	192.75	0.17
600.00	0.16	274.26	599.99	-2.97	-0.84	-2.97	3.08	195.82	0.24
700.00	0.14	273.49	699.99	-2.95	-1.10	-2.95	3.15	200.49	0.02
800.00	0.16	298.37	799.99	-2.87	-1.35	-2.87	3.17	205.15	0.07
900.00	0.15	315.82	899.99	-2.71	-1.56	-2.71	3.13	209.97	0.05
1000.00	0.16	328.51	999.99	-2.50	-1.73	-2.50	3.04	214.63	0.04
1100.00	0.07	325.73	1099.99	-2.33	-1.83	-2.33	2.97	218.14	0.09
1200.00	0.48	359.97	1199.99	-1.87	-1.87	-1.87	2.64	224.94	0.42
1300.00	0.72	355.04	1299.98	-0.83	-1.92	-0.83	2.09	246.64	0.24
1400.00	0.75	355.97	1399.97	0.45	-2.02	0.45	2.07	282.48	0.04
1500.00	0.88	6.18	1499.96	1.87	-1.98	1.87	2.72	313.26	0.20
1600.00	1.05	13.64	1599.95	3.52	-1.68	3.52	3.90	334.45	0.21

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	0.97	21.94	1699.93	5.20	-1.15	5.20	5.33	347.52	0.17
1800.00	1.17	44.93	1799.92	6.71	-0.12	6.71	6.71	359.01	0.47
1900.00	0.88	53.08	1899.90	7.89	1.22	7.89	7.98	8.79	0.32
2000.00	1.15	59.39	1999.88	8.86	2.70	8.86	9.27	16.94	0.29
2100.00	1.16	70.83	2099.86	9.70	4.51	9.70	10.70	24.94	0.23
2139.00	1.12	76.29	2138.86	9.92	5.25	9.92	11.23	27.90	0.30



CONCHO

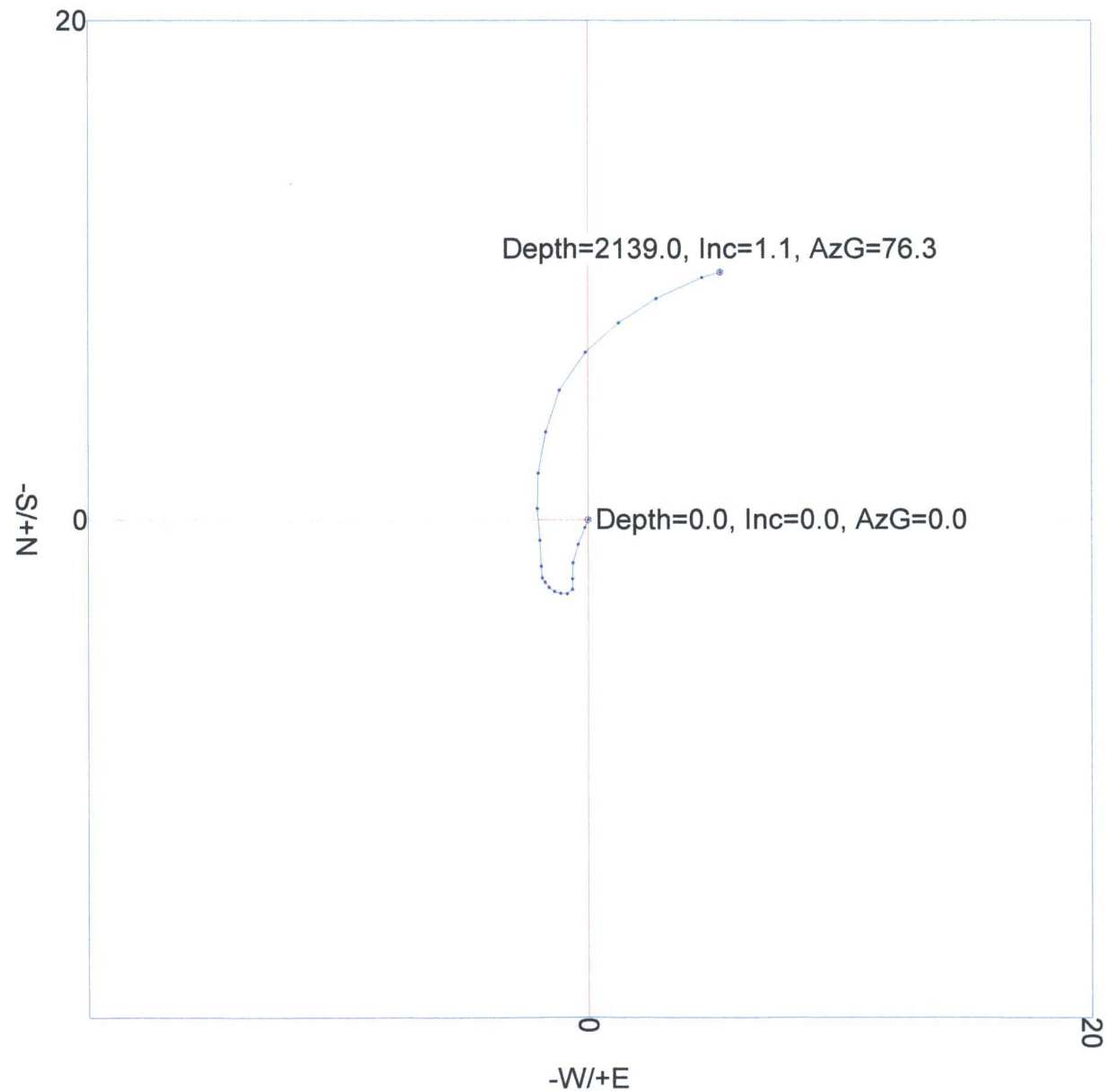
VES Survey International

Midland Tx

(432) 563-5444

Surveyor: Gene Heiss

Ragnar Federal Com No. 026H / API 30-025-43273



VES Survey Date: 1/28/2017



I Gene Heiss certify that I am employed by VES Survey International. That I did on the day(s) of 01/28/17 through 01/28/17 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,139.00 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 Ragnar Federal Com Well # 26H API # 30-025-43273 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 "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 01/28/17 through 01/28/17 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,139.00 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 Ragnar Federal Com Well # 26H API # 30-025-43273 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 "Gene Heiss", is written over a horizontal line.

Gene Heiss
Service Technician
VES Survey International