



COG Operating LLC

Lea County, NM (NAD-27 2015)

Ivar the Boneless Fed #12H

API: 30-025-42997

SHL: 85' FNL, 1283' FWL, Sec 22, T17S, R32E, Unit D

PP: 330' FSL, 951' FWL, Sec 15, T17S, R32E, Unit M

BHL: 351' FNL, 970' FWL, Sec 15, T17S, R32E, Unit D

Design: BHL: 350' FNL, 969' FWL, Sec 15, T17S, R32E, Unit D

Standard Survey Report

25 July, 2016

HOBBS OCD
OCT 14 2016
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Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Ivar the Boneless Fed #12H
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4033.00usft (Patriot 6)
Site:	Ivar the Boneless Fed #12H	MD Reference:	KB @ 4033.00usft (Patriot 6)
Well:	SHL: 85' FNL, 1283' FWL, Sec 22, T17S, R32E, Unit D	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 969' FWL, Sec 15, T17S, R32E, Unit D	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 969' FWL, Sec 15, T17S, R32E, Unit D	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		Ivar the Boneless Fed #12H			
Site Position:		Northing:	665,055.40 usft	Latitude:	32° 49' 37.209 N
From:	Map	Easting:	676,682.00 usft	Longitude:	103° 45' 29.388 W
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	0.31 °

Well	SHL: 85' FNL, 1283' FWL, Sec 22, T17S, R32E, Unit D					
Well Position	+N/-S	0.00 usft	Northing:	665,055.40 usft	Latitude:	32° 49' 37.209 N
	+E/-W	0.00 usft	Easting:	676,682.00 usft	Longitude:	103° 45' 29.388 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,015.00 usft

Wellbore	BHL: 350' FNL, 969' FWL, Sec 15, T17S, R32E, Unit D				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	7/6/2016	7.19	60.60	48,370

Design	BHL: 350' FNL, 969' FWL, Sec 15, T17S, R32E, Unit D				
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	356.07	

Survey Program	Date	7/25/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,116.00	VES Gyro #1 (BHL: 350' FNL, 969' FWL, S	VES-ISCWSA-GYRO-3	Biaxial Semi-Cont. Gyro	
2,224.00	10,461.00	TDS MWD #2 (BHL: 350' FNL, 969' FWL,	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	0.36	274.33	100.00	0.02	-0.31	0.05	0.36	0.36	0.00
200.00	0.30	304.33	200.00	0.20	-0.84	0.25	0.18	-0.06	30.00
300.00	0.17	263.52	300.00	0.33	-1.21	0.41	0.20	-0.13	-40.81
400.00	0.57	292.57	399.99	0.50	-1.81	0.62	0.43	0.40	29.05
500.00	0.55	291.32	499.99	0.87	-2.72	1.05	0.02	-0.02	-1.25
600.00	0.38	328.36	599.99	1.32	-3.34	1.55	0.34	-0.17	37.04

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Well:	SHL: 85' FNL, 1283' FWL, Sec 22, T17S, R32E, Unit D	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 969' FWL, Sec 15, T17S, R32E, Unit D	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 969' FWL, Sec 15, T17S, R32E, Unit D	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	0.28	283.50	699.99	1.66	-3.75	1.92	0.27	-0.10	-44.86	
800.00	0.23	327.93	799.98	1.89	-4.10	2.17	0.20	-0.05	44.43	
900.00	0.56	313.46	899.98	2.40	-4.56	2.70	0.34	0.33	-14.47	
1,000.00	0.46	322.20	999.98	3.05	-5.16	3.39	0.13	-0.10	8.74	
1,100.00	0.43	318.44	1,099.97	3.65	-5.65	4.03	0.04	-0.03	-3.76	
1,200.00	0.49	351.56	1,199.97	4.35	-5.96	4.75	0.27	0.06	33.12	
1,300.00	0.33	338.55	1,299.97	5.04	-6.13	5.45	0.18	-0.16	-13.01	
1,400.00	0.17	201.50	1,399.97	5.17	-6.29	5.59	0.47	-0.16	-137.05	
1,500.00	0.28	158.36	1,499.97	4.81	-6.26	5.22	0.19	0.11	-43.14	
1,600.00	0.60	102.56	1,599.97	4.47	-5.66	4.84	0.50	0.32	-55.80	
1,700.00	0.95	87.42	1,699.96	4.39	-4.32	4.67	0.40	0.35	-15.14	
1,800.00	1.34	81.47	1,799.94	4.60	-2.33	4.75	0.41	0.39	-5.95	
1,900.00	1.42	65.27	1,899.91	5.29	-0.05	5.28	0.40	0.08	-16.20	
2,000.00	1.71	66.95	1,999.87	6.39	2.45	6.21	0.29	0.29	1.68	
2,100.00	1.38	78.37	2,099.83	7.22	5.00	6.86	0.45	-0.33	11.42	
2,116.00	1.38	74.53	2,115.83	7.31	5.37	6.93	0.58	0.00	-24.00	
Tie-In to VES Gyro										
2,224.00	1.30	76.20	2,223.80	7.95	7.82	7.40	0.08	-0.07	1.55	
First TDS MWD Survey										
2,288.00	0.50	75.90	2,287.79	8.19	8.79	7.57	1.25	-1.25	-0.47	
2,383.00	1.80	272.00	2,382.78	8.34	7.70	7.80	2.40	1.37	-172.53	
2,478.00	2.20	268.30	2,477.72	8.34	4.39	8.02	0.44	0.42	-3.89	
2,573.00	3.20	270.10	2,572.61	8.29	-0.08	8.28	1.06	1.05	1.89	
2,668.00	4.70	269.80	2,667.39	8.28	-6.63	8.72	1.58	1.58	-0.32	
2,764.00	6.10	271.00	2,762.96	8.36	-15.66	9.41	1.46	1.46	1.25	
2,859.00	7.70	268.50	2,857.27	8.28	-27.07	10.12	1.71	1.68	-2.63	
2,954.00	8.70	267.70	2,951.29	7.83	-40.61	10.59	1.06	1.05	-0.84	
3,050.00	7.80	267.90	3,046.30	7.30	-54.38	11.01	0.94	-0.94	0.21	
3,145.00	8.10	266.20	3,140.39	6.62	-67.50	11.23	0.40	0.32	-1.79	
3,240.00	8.80	269.10	3,234.35	6.06	-81.44	11.63	0.86	0.74	3.05	
3,334.00	7.80	269.70	3,327.37	5.91	-95.01	12.41	1.07	-1.06	0.64	
3,430.00	8.20	272.70	3,422.44	6.20	-108.36	13.61	0.60	0.42	3.13	
3,525.00	9.10	271.50	3,516.35	6.72	-122.64	15.11	0.97	0.95	-1.26	
3,620.00	8.70	271.20	3,610.21	7.06	-137.33	16.46	0.42	-0.42	-0.32	
3,715.00	8.30	272.70	3,704.17	7.54	-151.37	17.89	0.48	-0.42	1.58	
3,810.00	9.10	270.50	3,798.07	7.92	-165.73	19.26	0.91	0.84	-2.32	
3,905.00	8.90	271.40	3,891.90	8.17	-180.59	20.53	0.26	-0.21	0.95	
4,000.00	9.10	264.00	3,985.74	7.56	-195.41	20.94	1.24	0.21	-7.79	
4,095.00	8.60	261.90	4,079.61	5.78	-209.91	20.15	0.63	-0.53	-2.21	
4,191.00	8.60	265.90	4,174.53	4.25	-224.17	19.61	0.62	0.00	4.17	
4,286.00	8.40	266.30	4,268.48	3.30	-238.18	19.61	0.22	-0.21	0.42	
4,381.00	8.30	265.20	4,362.48	2.28	-251.94	19.54	0.20	-0.11	-1.16	

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Survey									
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4,476.00	8.10	265.00	4,456.51	1.12	-265.44	19.31	0.21	-0.21	-0.21
4,571.00	6.90	263.30	4,550.69	-0.13	-277.78	18.91	1.28	-1.26	-1.79
4,666.00	5.90	263.70	4,645.10	-1.33	-288.30	18.43	1.05	-1.05	0.42
4,761.00	5.20	263.30	4,739.65	-2.37	-297.43	18.02	0.74	-0.74	-0.42
4,857.00	2.70	269.80	4,835.42	-2.89	-304.01	17.96	2.64	-2.60	6.77
4,952.00	0.50	5.40	4,930.38	-2.48	-306.21	18.51	2.94	-2.32	100.63
5,047.00	1.30	349.60	5,025.37	-1.01	-306.36	19.99	0.87	0.84	-16.63
5,079.00	4.50	347.50	5,057.32	0.58	-306.70	21.59	10.00	10.00	-6.56
5,110.00	8.40	349.40	5,088.12	3.99	-307.38	25.05	12.60	12.58	6.13
5,142.00	12.10	353.10	5,119.61	9.62	-308.21	30.72	11.74	11.56	11.56
5,174.00	15.30	356.80	5,150.69	17.17	-308.85	38.29	10.36	10.00	11.56
5,206.00	18.00	358.10	5,181.35	26.32	-309.25	47.46	8.52	8.44	4.06
5,238.00	20.70	356.80	5,211.54	36.92	-309.73	58.06	8.54	8.44	-4.06
5,269.00	23.20	354.60	5,240.29	48.47	-310.61	69.64	8.49	8.06	-7.10
5,301.00	25.50	353.60	5,269.44	61.59	-311.97	82.83	7.30	7.19	-3.13
5,333.00	28.40	353.40	5,297.96	76.00	-313.62	97.31	9.07	9.06	-0.63
5,365.00	30.20	353.70	5,325.87	91.56	-315.38	112.96	5.64	5.63	0.94
5,396.00	31.60	354.00	5,352.47	107.38	-317.08	128.86	4.54	4.52	0.97
5,428.00	32.40	354.40	5,379.60	124.26	-318.79	145.81	2.59	2.50	1.25
5,460.00	34.70	355.00	5,406.27	141.86	-320.42	163.49	7.26	7.19	1.88
5,481.00	36.70	355.60	5,423.32	154.08	-321.43	175.74	9.67	9.52	2.86
5,513.00	40.80	356.50	5,448.27	174.05	-322.80	195.77	12.93	12.81	2.81
5,545.00	43.30	356.90	5,472.03	195.45	-324.03	217.20	7.86	7.81	1.25
5,577.00	43.90	356.60	5,495.21	217.48	-325.28	239.26	1.98	1.88	-0.94
5,608.00	44.40	356.40	5,517.45	239.03	-326.60	260.86	1.67	1.61	-0.65
5,640.00	45.00	356.20	5,540.20	261.50	-328.05	283.36	1.93	1.88	-0.63
5,672.00	45.60	356.00	5,562.70	284.19	-329.60	306.11	1.93	1.88	-0.63
5,704.00	46.10	355.80	5,584.99	307.09	-331.24	329.07	1.63	1.56	-0.63
5,736.00	47.40	356.40	5,606.92	330.34	-332.83	352.38	4.29	4.06	1.88
5,767.00	50.00	357.90	5,627.38	353.60	-333.98	375.66	9.14	8.39	4.84
5,799.00	52.90	359.10	5,647.32	378.62	-334.63	400.66	9.52	9.06	3.75
5,830.00	56.40	0.20	5,665.25	403.89	-334.78	425.89	11.66	11.29	3.55
5,841.80	57.82	0.48	5,671.66	413.80	-334.72	435.77	12.16	12.00	2.39
As-Drilled PP									
5,860.00	60.00	0.90	5,681.06	429.39	-334.53	451.30	12.16	12.00	2.30
5,891.00	63.20	1.10	5,695.80	456.65	-334.05	478.47	10.34	10.32	0.65
5,923.00	65.30	0.90	5,709.70	485.46	-333.55	507.18	6.59	6.56	-0.63
5,954.00	68.30	0.60	5,721.91	513.95	-333.18	535.58	9.72	9.68	-0.97
5,986.00	71.60	2.70	5,732.88	543.99	-332.31	565.49	12.01	10.31	6.56
6,018.00	75.90	4.40	5,741.84	574.65	-330.40	595.94	14.37	13.44	5.31
6,050.00	80.40	3.70	5,748.41	605.88	-328.19	626.95	14.22	14.06	-2.19
6,081.00	84.40	1.50	5,752.51	636.57	-326.80	657.47	14.70	12.90	-7.10

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6,113.00	87.40	359.50	5,754.79	668.48	-326.52	689.29	11.26	9.38	-6.25	
6,145.00	88.10	359.40	5,756.05	700.45	-326.83	721.20	2.21	2.19	-0.31	
6,177.00	89.10	359.40	5,756.83	732.44	-327.16	753.14	3.13	3.13	0.00	
6,208.00	90.40	0.10	5,756.97	763.44	-327.30	784.08	4.76	4.19	2.26	
6,240.00	90.90	0.40	5,756.60	795.44	-327.16	815.99	1.82	1.56	0.94	
6,272.00	91.30	0.50	5,755.99	827.43	-326.91	847.89	1.29	1.25	0.31	
6,303.00	92.70	0.60	5,754.91	858.41	-326.61	878.77	4.53	4.52	0.32	
6,399.00	91.60	359.60	5,751.31	954.34	-326.44	974.47	1.55	-1.15	-1.04	
6,494.00	92.40	0.20	5,747.99	1,049.28	-326.61	1,069.20	1.05	0.84	0.63	
6,600.00	92.20	0.10	5,743.74	1,155.19	-326.33	1,174.84	0.21	-0.19	-0.09	
6,695.00	91.30	359.80	5,740.84	1,250.15	-326.41	1,269.58	1.00	-0.95	-0.32	
6,790.00	91.60	0.20	5,738.43	1,345.12	-326.41	1,364.33	0.53	0.32	0.42	
6,885.00	90.70	359.60	5,736.53	1,440.10	-326.58	1,459.09	1.14	-0.95	-0.63	
6,980.00	91.00	0.00	5,735.12	1,535.08	-326.91	1,553.88	0.53	0.32	0.42	
7,075.00	91.10	0.10	5,733.38	1,630.07	-326.83	1,648.64	0.15	0.11	0.11	
7,170.00	91.40	0.60	5,731.30	1,725.04	-326.25	1,743.35	0.61	0.32	0.53	
7,265.00	91.90	0.60	5,728.57	1,820.00	-325.25	1,838.01	0.53	0.53	0.00	
7,360.00	92.40	1.10	5,725.00	1,914.92	-323.85	1,932.61	0.74	0.53	0.53	
7,454.00	91.20	0.80	5,722.05	2,008.86	-322.29	2,026.22	1.32	-1.28	-0.32	
7,550.00	90.10	0.10	5,720.96	2,104.85	-321.54	2,121.94	1.36	-1.15	-0.73	
7,645.00	89.50	0.00	5,721.29	2,199.85	-321.45	2,216.71	0.64	-0.63	-0.11	
7,740.00	89.10	359.80	5,722.45	2,294.84	-321.62	2,311.49	0.47	-0.42	-0.21	
7,835.00	89.80	358.70	5,723.37	2,389.83	-322.86	2,406.33	1.37	0.74	-1.16	
7,930.00	91.60	359.00	5,722.21	2,484.80	-324.77	2,501.21	1.92	1.89	0.32	
8,026.00	91.00	358.10	5,720.03	2,580.74	-327.20	2,597.09	1.13	-0.63	-0.94	
8,121.00	90.70	357.50	5,718.62	2,675.66	-330.84	2,692.04	0.71	-0.32	-0.63	
8,216.00	92.20	358.90	5,716.21	2,770.57	-333.83	2,786.94	2.16	1.58	1.47	
8,311.00	92.00	0.00	5,712.73	2,865.51	-334.74	2,881.71	1.18	-0.21	1.16	
8,407.00	91.30	0.70	5,709.97	2,961.46	-334.15	2,977.40	1.03	-0.73	0.73	
8,502.00	91.50	0.50	5,707.65	3,056.43	-333.16	3,072.08	0.30	0.21	-0.21	
8,597.00	91.30	359.40	5,705.33	3,151.40	-333.24	3,166.83	1.18	-0.21	-1.16	
8,692.00	91.60	358.30	5,702.92	3,246.35	-335.15	3,261.68	1.20	0.32	-1.16	
8,787.00	91.00	358.50	5,700.77	3,341.29	-337.80	3,356.58	0.67	-0.63	0.21	
8,883.00	90.30	358.70	5,699.68	3,437.25	-340.14	3,452.48	0.76	-0.73	0.21	
8,978.00	90.90	359.20	5,698.68	3,532.23	-341.88	3,547.35	0.82	0.63	0.53	
9,073.00	91.30	359.20	5,696.86	3,627.20	-343.21	3,642.19	0.42	0.42	0.00	
9,168.00	90.70	359.60	5,695.20	3,722.18	-344.20	3,737.02	0.76	-0.63	0.42	
9,263.00	90.30	359.90	5,694.37	3,817.18	-344.62	3,831.82	0.53	-0.42	0.32	
9,359.00	89.90	0.10	5,694.20	3,913.18	-344.62	3,927.59	0.47	-0.42	0.21	
9,454.00	90.80	359.80	5,693.62	4,008.17	-344.70	4,022.37	1.00	0.95	-0.32	
9,549.00	91.80	359.70	5,691.47	4,103.15	-345.12	4,117.15	1.06	1.05	-0.11	
9,644.00	91.40	359.80	5,688.82	4,198.11	-345.53	4,211.92	0.43	-0.42	0.11	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Ivar the Boneless Fed #12H
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4033.00usft (Patriot 6)
Site:	Ivar the Boneless Fed #12H	MD Reference:	KB @ 4033.00usft (Patriot 6)
Well:	SHL: 85' FNL, 1283' FWL, Sec 22, T17S, R32E, Unit D	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 969' FWL, Sec 15, T17S, R32E, Unit D	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 969' FWL, Sec 15, T17S, R32E, Unit D	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)
9,739.00	90.80	359.80	5,686.99	4,293.09	-345.86	4,306.70	0.63	-0.63	0.00
9,835.00	92.10	359.80	5,684.56	4,389.06	-346.20	4,402.46	1.35	1.35	0.00
9,930.00	91.60	0.10	5,681.50	4,484.01	-346.28	4,497.20	0.61	-0.53	0.32
10,024.00	91.40	0.50	5,679.04	4,577.97	-345.79	4,590.91	0.48	-0.21	0.43
10,120.00	91.10	0.70	5,676.94	4,673.94	-344.78	4,686.58	0.38	-0.31	0.21
10,215.00	92.00	359.90	5,674.37	4,768.91	-344.29	4,781.29	1.27	0.95	-0.84
10,310.00	91.60	0.30	5,671.39	4,863.86	-344.12	4,876.01	0.60	-0.42	0.42
10,405.00	91.30	0.40	5,668.98	4,958.83	-343.54	4,970.71	0.33	-0.32	0.11
Final MWD Survey									
10,461.00	91.30	0.40	5,667.71	5,014.81	-343.15	5,026.54	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)	
2,116.00	2,115.83	7.31	5.37	Tie-In to VES Gyro
2,224.00	2,223.80	7.95	7.82	First TDS MWD Survey
5,841.80	5,671.66	413.80	-334.72	As-Drilled PP
10,405.00	5,668.98	4,958.83	-343.54	Final MWD Survey
10,461.00	5,667.71	5,014.81	-343.15	Projection to Bit/TD

Checked By: _____ Approved By: _____ Date: _____



PATRIOT DRILLING, LLC

OPERATOR: COG Operating, LLC
WELL/LEASE: Ivar the Boneless Fed 12H
COUNTY: Lea Co., New Mexico
Sec. 22, T 17S, R 32E

**STATE OF NEW MEXICO
DEVIATION REPORT**

<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
417	1/2	1,549	1/4
632	1/2	1,926	1 1/2
1,263	1/4	2,383	2

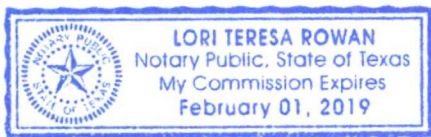
Patriot Drilling, LLC

M. Leroy Peterson, Executive Vice-President

The foregoing instrument was acknowledged before me on this 25th day of July 2016 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



July 8, 2016

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

Attn: Kanicia Castillo

RE: Ivar The Boneless Federal No. 012H

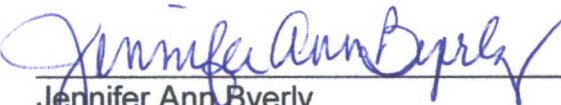
Please find enclosed a copy of the survey from 0' to 2116' ran on the above referenced well.

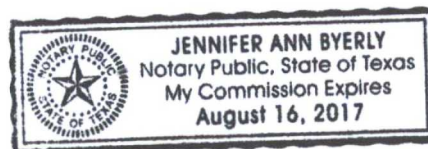
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 8th day of July, A.D., 2016, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: COG OPERATING
Lease/Well: IVAR THE BONELESS FEDERAL /012H



Rig Name: PATRIOT 6
State/County: NEW MEXICO/LEA
VS-Azi: 0.00 Degrees
Latitude: 32.82712, Longitude: -103.75867
Grid North = True North -0.31 degs (NAD 27)
Grid Correction Applied = -0.31 degs

Depth Reference : RKB=18 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: e-line gyro-de_01.ut
Minimum Curvature Method
Report Date/Time: 7/8/2016 / 13:17

VES Survey International
Woodward, Oklahoma
580-254-5000

Surveyor: Michael Cook

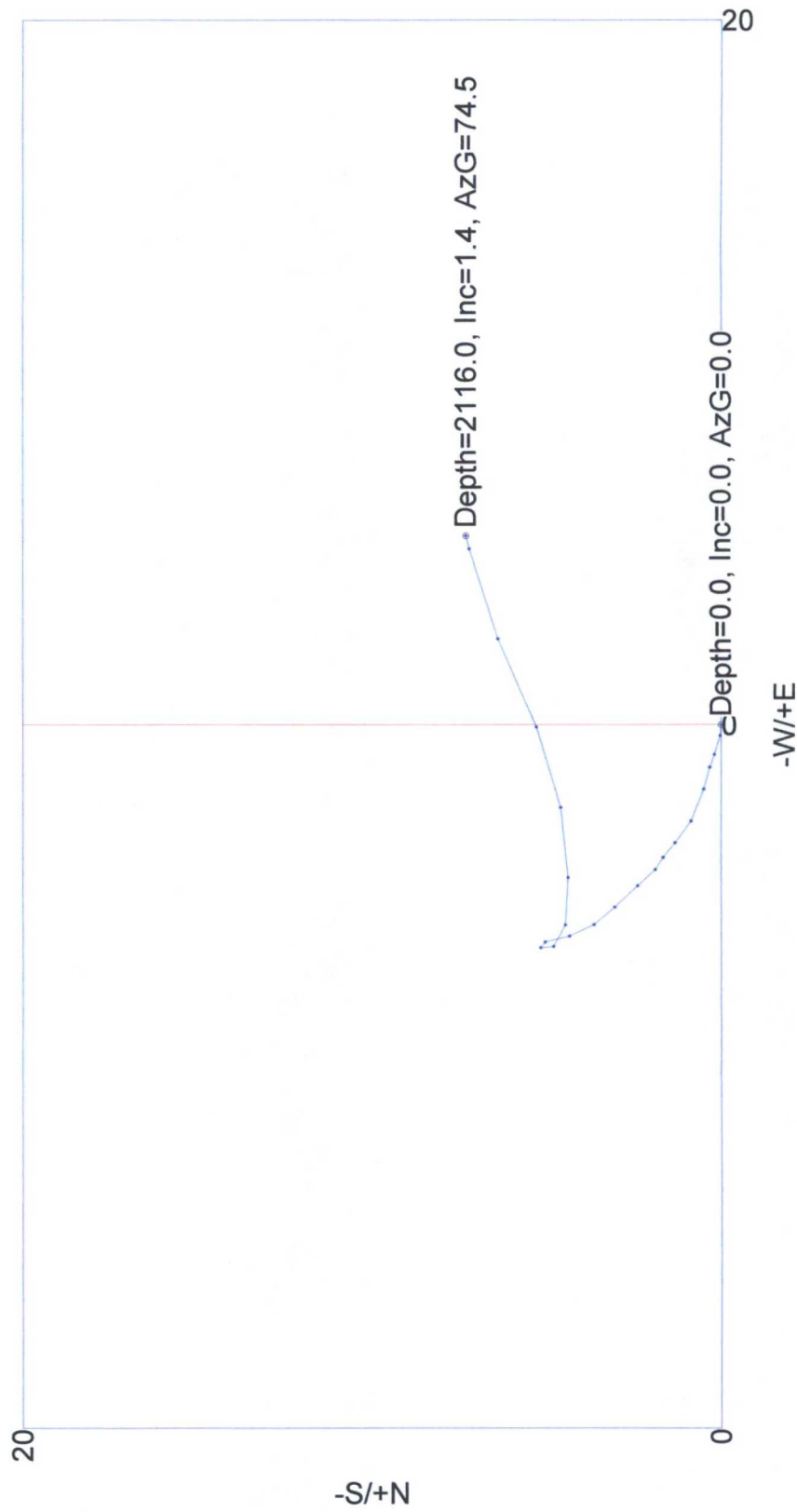
Ivar The Boneless Federal No. 012H /API 30-025-42997

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	0.36	274.33	100.00	0.02	-0.31	0.02	0.32	274.33	0.36
200.00	0.30	304.33	200.00	0.20	-0.84	0.20	0.87	283.00	0.18
300.00	0.17	263.52	300.00	0.33	-1.21	0.33	1.25	285.04	0.20
400.00	0.57	292.57	399.99	0.50	-1.82	0.50	1.89	285.35	0.43
500.00	0.55	291.32	499.99	0.87	-2.73	0.87	2.86	287.60	0.03
600.00	0.38	328.36	599.99	1.32	-3.35	1.32	3.60	291.57	0.33
700.00	0.28	283.50	699.99	1.67	-3.76	1.67	4.12	293.87	0.27
800.00	0.23	327.93	799.98	1.89	-4.11	1.89	4.53	294.71	0.20
900.00	0.56	313.46	899.98	2.40	-4.57	2.40	5.16	297.67	0.35
1000.00	0.46	322.20	999.98	3.05	-5.18	3.05	6.01	300.53	0.13
1100.00	0.43	318.44	1099.97	3.65	-5.67	3.65	6.75	302.77	0.04
1200.00	0.49	351.56	1199.97	4.36	-5.99	4.36	7.40	306.06	0.27
1300.00	0.33	338.55	1299.97	5.05	-6.15	5.05	7.96	309.37	0.18
1400.00	0.17	201.50	1399.97	5.18	-6.31	5.18	8.17	309.38	0.47
1500.00	0.28	158.36	1499.97	4.82	-6.28	4.82	7.91	307.49	0.20
1600.00	0.60	102.56	1599.97	4.47	-5.68	4.47	7.23	308.24	0.50

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	0.95	87.42	1699.96	4.40	-4.33	4.40	6.17	315.41	0.40
1800.00	1.34	81.47	1799.94	4.61	-2.35	4.61	5.17	333.01	0.41
1900.00	1.42	65.27	1899.91	5.30	-0.07	5.30	5.30	359.29	0.40
2000.00	1.71	66.95	1999.87	6.40	2.43	6.40	6.84	20.78	0.29
2100.00	1.38	78.37	2099.83	7.23	4.98	7.23	8.77	34.57	0.45
2116.00	1.38	74.53	2115.83	7.32	5.35	7.32	9.07	36.19	0.58



VES Survey International
Woodward, Oklahoma
580-254-5000
Surveyor: Michael Cook
ar The Boneless Federal No. 012H /API 30-025-42997





I Michael Cook certify that I am employed by VES Survey International. That I did on the day(s) of 07/05/16 through 07/05/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,116.00 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 Ivar The Boneless Federal Well # #012H API # 30-025-42997 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 "M. Cook", is written over a horizontal line.

Michael Cook
Service Technician
VES Survey International