



July 23, 2015

HOBBS OCD

SEP 17 2015

RECEIVED

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

Attn: Kanicia Castillo

30-025-42514

RE: Ivar the Boneless Federal No 011H

Please find enclosed a copy of the survey from 0' to 5050' ran on the above referenced well.

Sincerely,

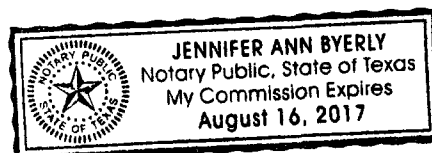
Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 23 day of July,
A.D., 2015, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas

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



SEP 23 2015



Company: Concho
Lease/Well: Ivar The Boneless Federal No/011H
Location: S22, T17S, R32E
Rig Name: United 43
State/County: New Mexico/Lea
VS-Azi: 0.00 Degrees
Latitude: 32.82703, Longitude: -103.76127
Grid North = True North -0.31 degs (NAD 27)
Grid Convergence Applied = -0.31 degs



Depth Reference : RKB = 12.5 Foot

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ...neless fed 11h_gyro survey.ut

Minimum Curvature Method

Report Date/Time: 7/23/2015 / 10:08

VES Survey International

West Texas

(432) 563-5444

Surveyor: Gene Heiss

Ivar the Boneless Federal No 011H / API 30-025-42514

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	320.57	100.00	0.24	-0.20	0.24	0.31	320.57	0.36
200.00	0.40	1.97	200.00	0.83	-0.39	0.83	0.91	335.10	0.27
300.00	0.33	3.76	300.00	1.46	-0.35	1.46	1.50	346.36	0.07
400.00	0.31	312.94	399.99	1.93	-0.53	1.93	2.00	344.54	0.27
500.00	0.42	221.68	499.99	1.84	-0.97	1.84	2.09	332.17	0.52
600.00	0.21	191.30	599.99	1.39	-1.25	1.39	1.87	318.08	0.26
700.00	0.35	244.04	699.99	1.08	-1.56	1.08	1.90	304.72	0.28
800.00	0.26	155.28	799.99	0.74	-1.74	0.74	1.89	293.10	0.43
900.00	0.13	150.82	899.99	0.44	-1.59	0.44	1.65	285.34	0.13
1000.00	0.29	162.81	999.99	0.10	-1.46	0.10	1.46	273.75	0.16
1100.00	0.37	176.18	1099.99	-0.46	-1.36	-0.46	1.44	251.15	0.11
1200.00	0.62	193.20	1199.98	-1.31	-1.46	-1.31	1.97	228.13	0.29
1300.00	0.49	164.62	1299.98	-2.26	-1.47	-2.26	2.70	213.14	0.30
1400.00	0.71	157.65	1399.97	-3.25	-1.12	-3.25	3.44	199.05	0.23
1500.00	0.45	105.72	1499.97	-3.93	-0.51	-3.93	3.97	187.33	0.56
1600.00	0.59	81.46	1599.96	-3.96	0.39	-3.96	3.98	174.45	0.26

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	1.24	83.64	1699.95	-3.77	1.97	-3.77	4.25	152.37	0.64
1800.00	1.66	77.70	1799.92	-3.34	4.46	-3.34	5.57	126.83	0.45
1900.00	1.74	74.88	1899.87	-2.63	7.34	-2.63	7.80	109.74	0.12
2000.00	1.63	76.07	1999.83	-1.89	10.19	-1.89	10.36	100.53	0.12
2100.00	1.63	79.61	2099.79	-1.30	12.97	-1.30	13.03	95.70	0.10
2200.00	1.09	92.98	2199.76	-1.09	15.32	-1.09	15.36	94.06	0.62
2300.00	1.11	120.15	2299.74	-1.62	17.10	-1.62	17.18	95.42	0.52
2400.00	1.07	134.82	2399.73	-2.76	18.60	-2.76	18.80	98.45	0.28
2500.00	1.08	157.48	2499.71	-4.29	19.62	-4.29	20.08	102.33	0.42
2600.00	0.86	178.01	2599.70	-5.91	20.00	-5.91	20.86	106.46	0.40
2700.00	0.90	192.57	2699.68	-7.43	19.86	-7.43	21.20	110.52	0.23
2800.00	0.96	202.82	2799.67	-8.98	19.36	-8.98	21.34	114.87	0.18
2900.00	1.02	201.58	2899.66	-10.58	18.71	-10.58	21.49	119.48	0.06
3000.00	1.02	202.66	2999.64	-12.23	18.04	-12.23	21.79	124.14	0.02
3100.00	0.84	202.71	3099.63	-13.73	17.41	-13.73	22.17	128.26	0.18
3200.00	1.29	203.32	3199.61	-15.44	16.68	-15.44	22.73	132.79	0.45
3300.00	1.26	191.41	3299.58	-17.55	16.02	-17.55	23.76	137.62	0.27
3400.00	1.32	206.82	3399.56	-19.66	15.28	-19.66	24.90	142.14	0.35
3500.00	1.41	197.27	3499.53	-21.86	14.39	-21.86	26.18	146.64	0.24
3600.00	1.46	217.43	3599.50	-24.05	13.25	-24.05	27.46	151.14	0.50
3700.00	1.42	199.57	3699.47	-26.23	12.07	-26.23	28.87	155.30	0.45
3800.00	1.53	203.83	3799.44	-28.62	11.11	-28.62	30.70	158.78	0.16
3900.00	1.53	208.12	3899.40	-31.02	9.94	-31.02	32.57	162.23	0.11
4000.00	1.50	207.40	3999.37	-33.36	8.71	-33.36	34.48	165.37	0.04
4100.00	1.16	204.33	4099.34	-35.45	7.69	-35.45	36.27	167.76	0.35
4200.00	1.16	208.54	4199.32	-37.26	6.79	-37.26	37.87	169.67	0.09
4300.00	1.44	209.57	4299.29	-39.23	5.69	-39.23	39.64	171.75	0.28
4400.00	0.96	225.28	4399.27	-40.91	4.47	-40.91	41.16	173.76	0.57
4500.00	0.79	229.49	4499.26	-41.95	3.35	-41.95	42.08	175.43	0.18
4600.00	0.95	212.73	4599.25	-43.10	2.38	-43.10	43.16	176.84	0.30
4700.00	0.86	215.59	4699.23	-44.41	1.50	-44.41	44.43	178.07	0.10
4800.00	0.73	218.48	4799.22	-45.52	0.66	-45.52	45.52	179.17	0.14
4900.00	0.63	212.47	4899.22	-46.48	-0.03	-46.48	46.48	180.04	0.12
5050.00	0.69	188.38	5049.21	-48.08	-0.61	-48.08	48.08	180.73	0.19



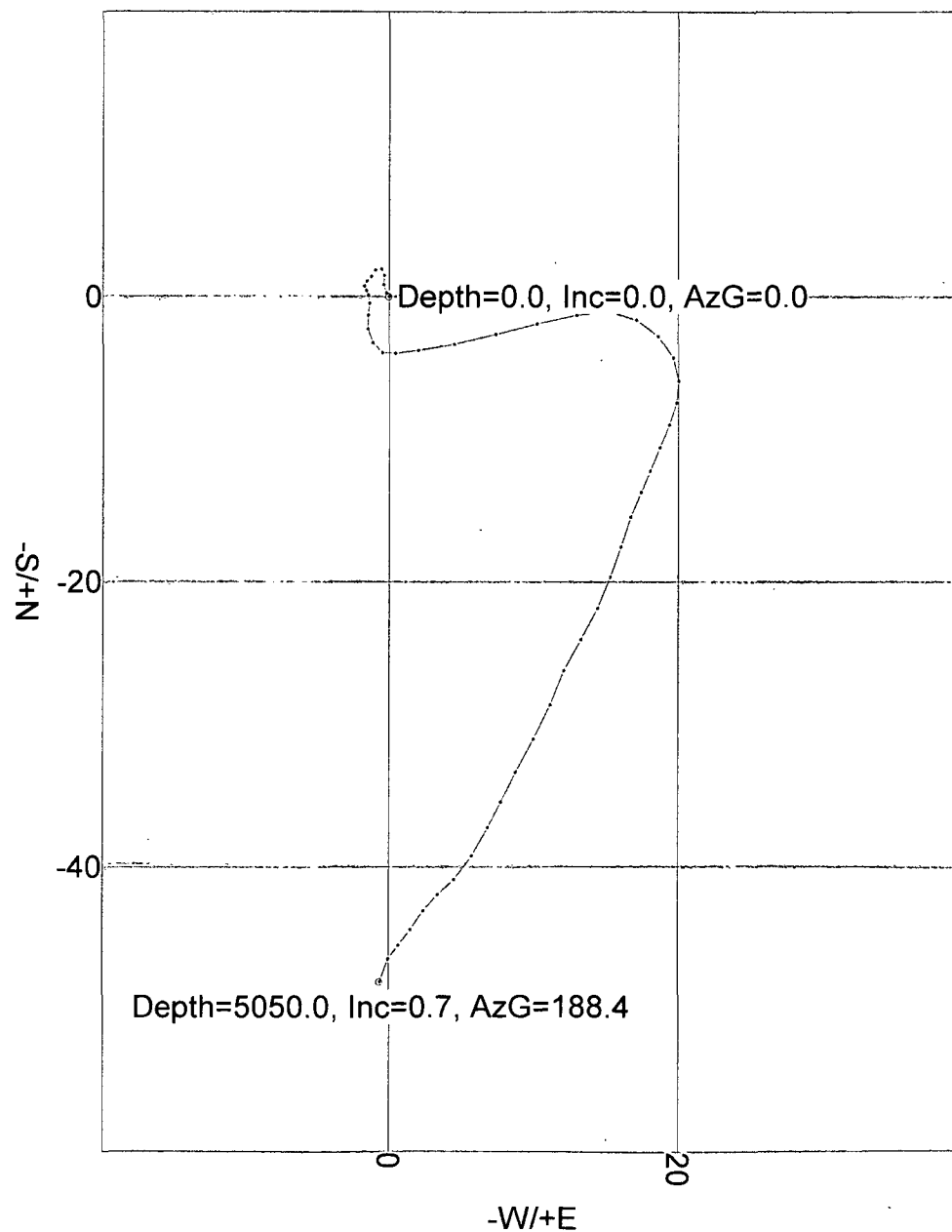
VES Survey International

West Texas

(432) 563-5444

Surveyor: Gene Heiss

Ivar the Boneless Federal No 011H / API 30-025-42514



VES Survey Date: 7/16/2015

WELL NAME AND NUMBER Ivar the Boneless Fed No. 11H
 LOCATION Section 22, T17S, R32E, Unit D, 75 FNL, 330 FWL, Lea Cty
 OPERATOR COG Operating LLC
 DRILLING CONTRACTOR United Drilling, Inc.

The undersigned hereby certifies that he is an authorized representative of the drilling contractor who drilled the above described well and had conducted deviation test and obtained the following results:

Degrees @ Depth	Degrees @ Depth	Degrees @ Depth
.2° @ 570'	5.3° @ 5260'	82.2° @ 5956'
.6° @ 917'	.9.6° @ 5292'	85.5° @ 5988'
.7° @ 1257'	14.4° @ 5324'	87.6° @ 6019'
1.2° @ 1607'	19.9° @ 5388'	90.6° @ 6051'
1.1° @ 1924'	26.5° @ 5452'	90.7° @ 6244'
1.6° @ 2142'	35.6° @ 5516'	89.8° @ 6437'
.9° @ 2433'	39.4° @ 5548'	92.0° @ 6629'
.7° @ 2848'	42.7° @ 5580'	90.8° @ 6724'
.9° @ 3238'	45.8° @ 5612'	91.1° @ 6820'
1.3° @ 3655'	49.1° @ 5644'	90.1° @ 7013'
.9° @ 3942'	52.2° @ 5617'	89.8° @ 7107'
1.0° @ 4362'	55.0° @ 5708'	89.4° @ 7203'
.3° @ 4748'	58.2° @ 5771'	90.5° @ 7298'
.8° @ 5084'	60.5° @ 5803'	89.9° @ 7394'
.8° @ 5130'	62.8° @ 5835'	91.2° @ 7491'
.7° @ 5163'	64.9° @ 5867'	91.0° @ 7597'
.5° @ 5195'	70.1° @ 5899'	91.0° @ 7682'
1.8° @ 5227'	75.4° @ 5923'	91.0° @ 7776'

Drilling Contractor- UNITED DRILLING, INC.

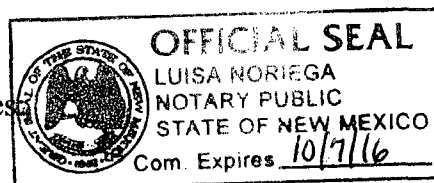
By: Angel Salazar
 (Angel Salazar)

Title: Vice President

Subscribed and sworn to before me this 28th day of July 2015.

Luisa Noriega
 Notary Public

My Commission Expires



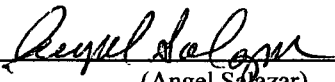
Carros NM
 County State

WELL NAME AND NUMBER Ivar the Boneless Fed No. 11H
 LOCATION Section 22, T17S, R32E, Unit D, 75 FNL, 330 FWL, Lea Cty
 OPERATOR COG Operating LLC
 DRILLING CONTRACTOR United Drilling, Inc.

The undersigned hereby certifies that he is an authorized representative of the drilling contractor who drilled the above described well and had conducted deviation test and obtained the following results:

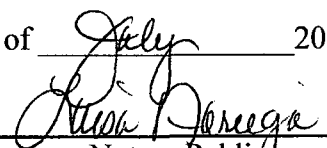
Degrees @ Depth	Degrees @ Depth	Degrees @ Depth
90.9° @ 7872'	92.9° @ 9896'	
90.9° @ 7967'	92.3° @ 9993'	
90.9° @ 8063'	91.2° @ 10185'	
90.5° @ 8159'	90.9° @ 10282'	
90.1° @ 8350'	93.5° @ 10482'	
90.2° @ 8447'		
90.7° @ 8641'		
90.9° @ 8737'		
91.0° @ 8834'		
90.9° @ 8931'		
92.0° @ 9027'		
91.8° @ 9123'		
91.3° @ 9220'		
90.9° @ 9316'		
92.4° @ 9413'		
92.0° @ 9510'		
91.8° @ 9607'		
92.4° @ 9799'		

Drilling Contractor- UNITED DRILLING, INC.

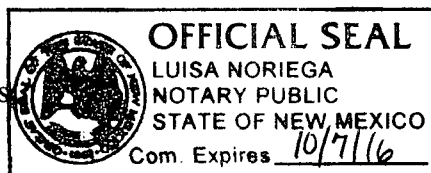
By: 
 (Angel Salazar)

Title: Vice President

Subscribed and sworn to before me this 28th day of July 2015.


 Notary Public

My Commission Expires



Chaves NM
 County State



30-025-42514

9/8/15

HOBBS

State of New Mexico
County of Lea

SEP 17 2015

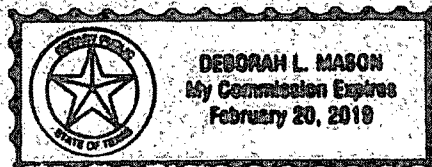
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I, Donald D. Mason, certify that: I am employed by Terra Directional Services LLC; that I did on the day(s) of 07/17/2015 through 07/22/2015 conduct or supervise the taking of a MWD survey from a depth of 5130 feet to a depth of 10536 feet; that the 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 Ivar the Boneless Federal #11H Well API 30-025-42514 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

8610 N New Braunfels, Suite 405

San Antonio, Texas 78217

(210) 826-2022



Customer Name: COG
 Well Name: Ivar The Boneless Federal #11H
 API Number: 30-025-42514
 County / Parish: Lea Co, NM

M.W.D. Operator: Justin Campos
 Directional Driller: John Overton
 Total Magnetic Correction: 6.99
 Job #: NM-552

Vertical Section: 359.88

Tie In Survey(s) Provided By:

VES

	Meas. Depth	Inc.	Azm.	T.V.D.	Ver. Sect.	+N / -S	+E / -W	Dist.	Angle	DLS
Tie - In										
0	5050.00	0.69	188.38	5049.21	-48.08	-48.08	-0.61	48.08	180.73	0.19
1	5130.00	0.80	199.40	5129.20	-49.08	-49.08	-0.87	49.09	181.01	0.23
2	5163.00	0.70	202.30	5162.20	-49.48	-49.49	-1.02	49.50	181.18	0.32
3	5195.00	0.50	205.50	5194.20	-49.79	-49.79	-1.15	49.81	181.33	0.63
4	5227.00	1.80	2.90	5226.19	-49.42	-49.42	-1.19	49.43	181.38	7.09
5	5260.00	5.30	6.20	5259.13	-47.38	-47.38	-1.00	47.40	181.21	10.62
6	5292.00	9.60	5.80	5290.85	-43.26	-43.26	-0.57	43.26	180.75	13.44
7	5324.00	14.40	4.90	5322.14	-36.64	-36.64	0.04	36.64	179.93	15.01
8	5356.00	18.00	6.70	5352.86	-27.76	-27.76	0.96	27.77	178.02	11.36
9	5388.00	19.90	9.80	5383.13	-17.48	-17.48	2.46	17.65	171.98	6.72
10	5420.00	22.70	8.70	5412.94	-6.02	-6.01	4.32	7.40	144.25	8.84
11	5452.00	26.50	6.60	5442.03	7.18	7.19	6.08	9.42	40.21	12.18
12	5484.00	30.90	4.20	5470.09	22.47	22.49	7.50	23.71	18.45	14.21
13	5516.00	35.60	3.30	5496.85	39.97	39.99	8.64	40.91	12.19	14.77
14	5548.00	39.40	2.90	5522.23	59.42	59.44	9.69	60.22	9.26	11.90
15	5580.00	42.70	2.40	5546.36	80.41	80.43	10.66	81.13	7.55	10.36
16	5612.00	45.80	2.50	5569.28	102.71	102.73	11.62	103.39	6.45	9.69
17	5644.00	49.10	2.40	5590.92	126.26	126.28	12.62	126.91	5.71	10.32
18	5677.00	52.20	1.40	5611.84	151.76	151.79	13.46	152.38	5.07	9.68
19	5708.00	55.00	0.30	5630.23	176.70	176.73	13.83	177.27	4.47	9.47
20	5740.00	56.80	0.30	5648.17	203.20	203.23	13.97	203.71	3.93	5.63
21	5771.00	58.20	358.70	5664.83	229.34	229.37	13.74	229.78	3.43	6.27
22	5803.00	60.50	359.80	5681.14	256.87	256.89	13.38	257.24	2.98	7.77
23	5835.00	62.80	0.80	5696.34	285.02	285.05	13.53	285.37	2.72	7.70
24	5867.00	64.90	358.60	5710.44	313.74	313.77	13.37	314.06	2.44	9.01
25	5899.00	70.10	356.80	5722.68	343.28	343.30	12.18	343.52	2.03	17.06
26	5923.00	75.40	356.10	5729.80	366.15	366.17	10.76	366.33	1.68	22.26
27	5956.00	82.20	356.10	5736.20	398.43	398.45	8.56	398.54	1.23	20.61
28	5988.00	85.50	357.50	5739.63	430.19	430.21	6.78	430.26	0.90	11.19
29	6019.00	87.60	359.20	5741.50	461.12	461.14	5.89	461.17	0.73	8.71
30	6051.00	90.60	2.00	5742.00	493.11	493.12	6.23	493.16	0.72	12.82
31	6148.00	90.90	2.40	5740.73	590.02	590.04	9.95	590.13	0.97	0.52
32	6244.00	90.70	2.70	5739.39	685.91	685.94	14.22	686.09	1.19	0.38
33	6341.00	90.30	359.60	5738.54	782.87	782.90	16.17	783.07	1.18	3.22
34	6437.00	89.80	359.10	5738.46	878.86	878.90	15.08	879.03	0.98	0.74
35	6533.00	92.10	358.80	5736.87	974.83	974.86	13.32	974.95	0.78	2.42
36	6629.00	92.00	359.10	5733.43	1070.76	1070.78	11.56	1070.85	0.62	0.33
37	6724.00	90.80	1.20	5731.11	1165.72	1165.75	11.81	1165.81	0.58	2.55
38	6820.00	91.10	0.70	5729.52	1261.69	1261.72	13.40	1261.79	0.61	0.61
39	6917.00	90.30	1.20	5728.33	1358.67	1358.70	15.01	1358.78	0.63	0.97
40	7013.00	90.10	0.60	5728.00	1454.65	1454.69	16.52	1454.78	0.65	0.66
41	7107.00	89.80	0.30	5728.08	1548.64	1548.68	17.26	1548.78	0.64	0.45
42	7203.00	89.40	359.90	5728.75	1644.64	1644.68	17.43	1644.77	0.61	0.59
43	7298.00	90.50	359.40	5728.83	1739.64	1739.68	16.85	1739.76	0.55	1.27
44	7394.00	89.90	359.30	5728.50	1835.63	1835.67	15.76	1835.74	0.49	0.63
45	7491.00	91.20	359.10	5727.57	1932.62	1932.65	14.40	1932.71	0.43	1.36

46	7587.00	91.00	358.90	5725.72	2028.59	2028.62	12.73	2028.66	0.36	0.29
47	7682.00	91.00	358.70	5724.07	2123.56	2123.59	10.74	2123.61	0.29	0.21
48	7776.00	91.00	358.60	5722.43	2217.52	2217.55	8.52	2217.56	0.22	0.11
49	7872.00	90.90	358.60	5720.83	2313.49	2313.50	6.18	2313.51	0.15	0.10
50	7967.00	90.90	359.30	5719.34	2408.46	2408.48	4.44	2408.48	0.11	0.74
51	8063.00	90.90	359.10	5717.83	2504.44	2504.45	3.10	2504.46	0.07	0.21
52	8159.00	90.50	359.30	5716.66	2600.43	2600.44	1.76	2600.44	0.04	0.47
53	8254.00	90.50	359.40	5715.83	2695.42	2695.43	0.68	2695.43	0.01	0.11
54	8350.00	90.10	359.30	5715.33	2791.41	2791.42	-0.41	2791.42	359.99	0.43
55	8447.00	90.20	359.90	5715.08	2888.41	2888.42	-1.09	2888.42	359.98	0.63
56	8544.00	91.40	0.30	5713.72	2985.40	2985.41	-0.92	2985.41	359.98	1.30
57	8641.00	90.70	359.70	5711.94	3082.38	3082.39	-0.92	3082.39	359.98	0.95
58	8737.00	90.90	359.60	5710.60	3178.37	3178.38	-1.50	3178.38	359.97	0.23
59	8834.00	91.00	359.30	5709.00	3275.36	3275.36	-2.43	3275.36	359.96	0.33
60	8931.00	90.90	359.20	5707.39	3372.34	3372.34	-3.70	3372.34	359.94	0.15
61	9027.00	92.00	359.90	5704.96	3468.30	3468.30	-4.46	3468.30	359.93	1.36
62	9123.00	91.80	359.70	5701.78	3564.25	3564.25	-4.79	3564.25	359.92	0.29
63	9220.00	91.30	359.30	5699.15	3661.21	3661.21	-5.64	3661.21	359.91	0.66
64	9316.00	90.90	358.70	5697.31	3757.18	3757.18	-7.31	3757.18	359.89	0.75
65	9413.00	92.40	359.30	5694.52	3854.13	3854.12	-9.01	3854.13	359.87	1.67
66	9510.00	92.00	358.90	5690.79	3951.05	3951.03	-10.53	3951.05	359.85	0.58
67	9607.00	91.80	359.70	5687.58	4047.99	4047.97	-11.71	4047.99	359.83	0.85
68	9703.00	91.20	359.70	5685.06	4143.95	4143.94	-12.22	4143.96	359.83	0.63
69	9799.00	92.40	0.90	5682.05	4239.90	4239.89	-11.71	4239.90	359.84	1.77
70	9896.00	92.90	0.60	5677.56	4336.79	4336.77	-10.45	4336.79	359.86	0.60
71	9993.00	92.30	0.70	5673.16	4433.68	4433.67	-9.35	4433.68	359.88	0.63
72	10089.00	90.60	1.10	5670.73	4529.63	4529.62	-7.84	4529.63	359.90	1.82
73	10185.00	91.20	0.90	5669.23	4625.60	4625.59	-6.16	4625.60	359.92	0.66
74	10282.00	90.90	1.20	5667.45	4722.56	4722.56	-4.39	4722.56	359.95	0.44
75	10379.00	92.00	0.60	5664.99	4819.51	4819.52	-2.86	4819.52	359.97	1.29
76	10482.00	93.50	0.50	5660.05	4922.38	4922.39	-1.88	4922.39	359.98	1.46
PTB	10536.00	93.50	0.50	5656.75	4976.28	4976.29	-1.40	4976.29	359.98	0.00



COG Operating LLC

Lea County, NM

Ivar the Boneless Federal #11H

SHL: 75' FNL, 330' FWL, Sec 22, T17S, R32E, Unit D

EOC: 6057.3' MD, 5750.0' TVD, 479.6' N, 15.6' E, 479.5' VS

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

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

Standard Survey Report

23 July, 2015





TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 75' FNL, 330' FWL, Sec 22, T17S, R32E, Unit D
Project:	Lea County, NM	TVD Reference:	KB @ 4028.0usft (United 43)
Site:	Ivar the Boneless Federal #11H	MD Reference:	KB @ 4028.0usft (United 43)
Well:	SHL: 75' FNL, 330' FWL, Sec 22, T17S, R32E, Unit D	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 350' FWL, Sec 15, T17S, R32E, Unit D	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 350' FWL, Sec 15, T17S, R32E, Unit D	Database:	EDM 5000.1 Single User Db

Project	Lea County, NM		
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 Federal #11H		
Site Position:		Northing:	665,061.60 usft
From:	Map	Easting:	675,728.90 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 49' 37.322 N
		Longitude:	103° 45' 40.557 W
		Grid Convergence:	0.31 °

Well	SHL: 75' FNL, 330' FWL, Sec 22, T17S, R32E, Unit D		
Well Position	+N/-S	0.0 usft	Northing: 665,061.60 usft
	+E/-W	0.0 usft	Easting: 675,728.90 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 49' 37.322 N
		Longitude:	103° 45' 40.557 W
		Ground Level:	4,016.0 usft

Wellbore	BHL: 350' FNL, 350' FWL, Sec 15, T17S, R32E, Unit D		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2015	7/6/2015	7.30
			Dip Angle (°)
			60.61
			Field Strength (nT)
			48,473

Design	BHL: 350' FNL, 350' FWL, Sec 15, T17S, R32E, Unit D		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction (°)
			359.88

Survey Program	Date: 7/23/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
100.0	5,050.0	Gyro #1 (BHL: 350' FNL, 350' FWL, Sec 15	NS-GYRO-SS
5,130.0	10,536.0	MWD #2 (BHL: 350' FNL, 350' FWL, Sec 1	MWD
			Description
			NS Gyro single shots
			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)
	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
	100.0	0.36	320.57	100.0	0.2	-0.2	0.2	0.36	0.36	0.00
	200.0	0.40	1.97	200.0	0.8	-0.4	0.8	0.27	0.04	41.40
	300.0	0.33	3.76	300.0	1.5	-0.4	1.5	0.07	-0.07	1.79
	400.0	0.31	312.94	400.0	1.9	-0.5	1.9	0.28	-0.02	-50.82
	500.0	0.42	221.68	500.0	1.9	-1.0	1.9	0.53	0.11	-91.26
	600.0	0.21	191.30	600.0	1.4	-1.3	1.4	0.26	-0.21	-30.38



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 75' FNL, 330' FWL, Sec 22, T17S, R32E, Unit D
Project:	Lea County, NM	TVD Reference:	KB @ 4028.0usft (United 43)
Site:	Ivar the Boneless Federal #11H	MD Reference:	KB @ 4028.0usft (United 43)
Well:	SHL: 75' FNL, 330' FWL, Sec 22, T17S, R32E, Unit D	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 350' FWL, Sec 15, T17S, R32E, Unit D	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 350' FWL, Sec 15, T17S, R32E, Unit D	Database:	EDM 5000.1 Single User Db

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)
700.0	0.35	244.04	700.0	1.1	-1.6	1.1	0.28	0.14	52.74
800.0	0.26	155.28	800.0	0.7	-1.7	0.7	0.43	-0.09	-88.76
900.0	0.13	150.82	900.0	0.4	-1.6	0.4	0.13	-0.13	-4.46
1,000.0	0.29	162.81	1,000.0	0.1	-1.5	0.1	0.17	0.16	11.99
1,100.0	0.37	176.18	1,100.0	-0.5	-1.4	-0.5	0.11	0.08	13.37
1,200.0	0.62	193.20	1,200.0	-1.3	-1.5	-1.3	0.29	0.25	17.02
1,300.0	0.49	164.62	1,300.0	-2.3	-1.5	-2.2	0.30	-0.13	-28.58
1,400.0	0.71	157.65	1,400.0	-3.2	-1.1	-3.2	0.23	0.22	-6.97
1,500.0	0.45	105.72	1,500.0	-3.9	-0.5	-3.9	0.56	-0.26	-51.93
1,600.0	0.59	81.46	1,600.0	-3.9	0.4	-3.9	0.26	0.14	-24.26
1,700.0	1.24	83.64	1,700.0	-3.8	2.0	-3.8	0.65	0.65	2.18
1,800.0	1.66	77.70	1,799.9	-3.3	4.4	-3.3	0.45	0.42	-5.94
1,900.0	1.74	74.88	1,899.9	-2.6	7.3	-2.6	0.12	0.08	-2.82
2,000.0	1.63	76.07	1,999.8	-1.9	10.2	-1.9	0.12	-0.11	1.19
2,100.0	1.63	79.61	2,099.8	-1.3	12.9	-1.3	0.10	0.00	3.54
2,200.0	1.09	92.98	2,199.8	-1.1	15.3	-1.1	0.62	-0.54	13.37
2,300.0	1.11	120.15	2,299.7	-1.6	17.1	-1.6	0.52	0.02	27.17
2,400.0	1.07	134.82	2,399.7	-2.8	18.6	-2.8	0.28	-0.04	14.67
2,500.0	1.08	157.48	2,499.7	-4.3	19.6	-4.3	0.42	0.01	22.66
2,600.0	0.86	178.01	2,599.7	-5.9	20.0	-5.9	0.41	-0.22	20.53
2,700.0	0.90	192.57	2,699.7	-7.4	19.9	-7.5	0.23	0.04	14.56
2,800.0	0.96	202.82	2,799.7	-9.0	19.4	-9.0	0.18	0.06	10.25
2,900.0	1.02	201.58	2,899.7	-10.6	18.7	-10.6	0.06	0.06	-1.24
3,000.0	1.02	202.66	2,999.6	-12.2	18.0	-12.2	0.02	0.00	1.08
3,100.0	0.84	202.71	3,099.6	-13.7	17.4	-13.7	0.18	-0.18	0.05
3,200.0	1.29	203.32	3,199.6	-15.4	16.7	-15.4	0.45	0.45	0.61
3,300.0	1.26	191.41	3,299.6	-17.5	16.0	-17.6	0.27	-0.03	-11.91
3,400.0	1.32	206.82	3,399.6	-19.6	15.3	-19.7	0.35	0.06	15.41
3,500.0	1.41	197.27	3,499.5	-21.8	14.4	-21.9	0.24	0.09	-9.55
3,600.0	1.46	217.43	3,599.5	-24.0	13.3	-24.0	0.50	0.05	20.16
3,700.0	1.42	199.57	3,699.5	-26.2	12.1	-26.2	0.45	-0.04	-17.86
3,800.0	1.53	203.83	3,799.4	-28.6	11.1	-28.6	0.16	0.11	4.26
3,900.0	1.53	208.12	3,899.4	-31.0	9.9	-31.0	0.11	0.00	4.29
4,000.0	1.50	207.40	3,999.4	-33.3	8.7	-33.3	0.04	-0.03	-0.72
4,100.0	1.16	204.33	4,099.3	-35.4	7.7	-35.4	0.35	-0.34	-3.07
4,200.0	1.16	208.54	4,199.3	-37.2	6.8	-37.2	0.09	0.00	4.21
4,300.0	1.44	209.57	4,299.3	-39.2	5.7	-39.2	0.28	0.28	1.03
4,400.0	0.96	225.28	4,399.3	-40.9	4.5	-40.9	0.58	-0.48	15.71
4,500.0	0.79	229.49	4,499.3	-41.9	3.4	-41.9	0.18	-0.17	4.21
4,600.0	0.95	212.73	4,599.2	-43.1	2.4	-43.1	0.30	0.16	-16.76
4,700.0	0.86	215.59	4,699.2	-44.4	1.5	-44.4	0.10	-0.09	2.86



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL 75° FNL 330° FWL Sec 22 T17S R32E Unit D
Project:	Lea County NM	TVD Reference:	KB @ 4028.0usft (United 43)
Site:	Ivar the Boneless Federal #11H	MD Reference:	KB @ 4028.0usft (United 43)
Well:	SHL 75° FNL 330° FWL Sec 22 T17S R32E Unit D	North Reference:	Grid
Wellbore:	BHL 350° FNL 350° FWL Sec 15 T17S R32E Unit D	Survey Calculation Method:	Minimum Curvature
Design:	BHL 350° FNL 350° FWL Sec 15 T17S R32E Unit D	Database:	EDM 5000-1 Single User Db

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)
4,800.0	0.73	218.48	4,799.2	-45.5	0.7	-45.5	0.14	-0.13	2.89
4,900.0	0.63	212.47	4,899.2	-46.4	0.0	-46.4	0.12	-0.10	-6.01
5,050.0	0.69	188.38	5,049.2	-48.0	-0.6	-48.0	0.19	0.04	-16.06
TIE-IN to VES Gyro									
5,130.0	0.80	199.40	5,129.2	-49.0	-0.9	-49.0	0.23	0.14	13.78
5,163.0	0.70	202.30	5,162.2	-49.4	-1.0	-49.4	0.32	-0.30	8.79
5,195.0	0.50	205.50	5,194.2	-49.8	-1.1	-49.7	0.63	-0.63	10.00
5,227.0	1.80	2.90	5,226.2	-49.4	-1.2	-49.4	7.09	4.06	491.88
5,260.0	5.30	6.20	5,259.1	-47.3	-1.0	-47.3	10.62	10.61	10.00
5,292.0	9.60	5.80	5,290.8	-43.2	-0.6	-43.2	13.44	13.44	-1.25
5,324.0	14.40	4.90	5,322.1	-36.6	0.0	-36.6	15.01	15.00	-2.81
5,356.0	18.00	6.70	5,352.9	-27.7	1.0	-27.7	11.36	11.25	5.63
5,388.0	19.90	9.80	5,383.1	-17.4	2.5	-17.4	6.72	5.94	9.69
5,420.0	22.70	8.70	5,412.9	-6.0	4.3	-6.0	8.84	8.75	-3.44
5,452.0	26.50	6.60	5,442.0	7.2	6.1	7.2	12.18	11.88	-6.56
5,484.0	30.90	4.20	5,470.1	22.5	7.5	22.5	14.21	13.75	-7.50
5,516.0	35.60	3.30	5,496.8	40.0	8.6	40.0	14.77	14.69	-2.81
5,548.0	39.40	2.90	5,522.2	59.5	9.7	59.5	11.90	11.88	-1.25
5,580.0	42.70	2.40	5,546.4	80.5	10.7	80.4	10.36	10.31	-1.56
5,612.0	45.80	2.50	5,569.3	102.8	11.6	102.8	9.69	9.69	0.31
5,644.0	49.10	2.40	5,590.9	126.3	12.6	126.3	10.32	10.31	-0.31
5,677.0	52.20	1.40	5,611.8	151.8	13.5	151.8	9.68	9.39	-3.03
5,708.0	55.00	0.30	5,630.2	176.8	13.8	176.7	9.47	9.03	-3.55
5,740.0	56.80	0.30	5,648.2	203.3	14.0	203.2	5.63	5.63	0.00
5,771.0	58.20	358.70	5,664.8	229.4	13.7	229.4	6.27	4.52	-5.16
5,803.0	60.50	359.80	5,681.1	256.9	13.4	256.9	7.77	7.19	3.44
5,835.0	62.80	0.80	5,696.3	285.1	13.5	285.1	7.70	7.19	3.13
5,867.0	64.90	358.60	5,710.4	313.8	13.4	313.8	9.01	6.56	-6.88
5,899.0	70.10	356.80	5,722.7	343.3	12.2	343.3	17.06	16.25	-5.63
5,923.0	75.40	356.10	5,729.8	366.2	10.8	366.2	22.26	22.08	-2.92
5,956.0	82.20	356.10	5,736.2	398.5	8.6	398.5	20.61	20.61	0.00
5,988.0	85.50	357.50	5,739.6	430.3	6.8	430.2	11.19	10.31	4.38
6,019.0	87.60	359.20	5,741.5	461.2	5.9	461.2	8.71	6.77	5.48
6,051.0	90.60	2.00	5,742.0	493.2	6.2	493.2	12.82	9.38	8.75
6,148.0	90.90	2.40	5,740.7	590.1	10.0	590.1	0.52	0.31	0.41
6,244.0	90.70	2.70	5,739.4	686.0	14.2	686.0	0.38	-0.21	0.31
6,341.0	90.30	359.60	5,738.5	782.9	16.2	782.9	3.22	-0.41	-3.20
6,437.0	89.80	359.10	5,738.5	878.9	15.1	878.9	0.74	-0.52	-0.52
6,533.0	92.10	358.80	5,736.9	974.9	13.3	974.9	2.42	2.40	-0.31
6,629.0	92.00	359.10	5,733.4	1,070.8	11.6	1,070.8	0.33	-0.10	0.31
6,724.0	90.80	1.20	5,731.1	1,165.8	11.8	1,165.8	2.55	-1.26	2.21



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 75' FNL, 330' FWL, Sec 22, T17S, R32E; Unit D
Project:	Lea County, NM	TVD Reference:	KB @ 4028.0usft (United 43)
Site:	Ivar the Boneless Federal #11H	MD Reference:	KB @ 4028.0usft (United 43)
Well:	SHL: 75' FNL, 330' FWL, Sec 22, T17S, R32E, Unit D	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 350' FWL, Sec 15, T17S, R32E, Unit D	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 350' 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)
6,820.0	91.10	0.70	5,729.5	1,261.8	13.4	1,261.7	0.61	0.31	-0.52
6,917.0	90.30	1.20	5,728.3	1,358.7	15.0	1,358.7	0.97	-0.82	0.52
7,013.0	90.10	0.60	5,728.0	1,454.7	16.5	1,454.7	0.66	-0.21	-0.63
7,107.0	89.80	0.30	5,728.1	1,548.7	17.3	1,548.7	0.45	-0.32	-0.32
7,203.0	89.40	359.90	5,728.7	1,644.7	17.4	1,644.7	0.59	-0.42	-0.42
7,298.0	90.50	359.40	5,728.8	1,739.7	16.8	1,739.7	1.27	1.16	-0.53
7,394.0	89.90	359.30	5,728.5	1,835.7	15.8	1,835.7	0.63	-0.63	-0.10
7,491.0	91.20	359.10	5,727.6	1,932.7	14.4	1,932.7	1.36	1.34	-0.21
7,587.0	91.00	358.90	5,725.7	2,028.7	12.7	2,028.6	0.29	-0.21	-0.21
7,682.0	91.00	358.70	5,724.1	2,123.6	10.7	2,123.6	0.21	0.00	-0.21
7,776.0	91.00	358.60	5,722.4	2,217.6	8.5	2,217.6	0.11	0.00	-0.11
7,872.0	90.90	358.60	5,720.8	2,313.5	6.2	2,313.5	0.10	-0.10	0.00
7,967.0	90.90	359.30	5,719.3	2,408.5	4.4	2,408.5	0.74	0.00	0.74
8,063.0	90.90	359.10	5,717.8	2,504.5	3.1	2,504.5	0.21	0.00	-0.21
8,159.0	90.50	359.30	5,716.7	2,600.5	1.8	2,600.5	0.47	-0.42	0.21
8,254.0	90.50	359.40	5,715.8	2,695.5	0.7	2,695.5	0.11	0.00	0.11
8,350.0	90.10	359.30	5,715.3	2,791.5	-0.4	2,791.5	0.43	-0.42	-0.10
8,447.0	90.20	359.90	5,715.1	2,888.5	-1.1	2,888.5	0.63	0.10	0.62
8,544.0	91.40	0.30	5,713.7	2,985.4	-0.9	2,985.4	1.30	1.24	0.41
8,641.0	90.70	359.70	5,711.9	3,082.4	-0.9	3,082.4	0.95	-0.72	-0.62
8,737.0	90.90	359.60	5,710.6	3,178.4	-1.5	3,178.4	0.23	0.21	-0.10
8,834.0	91.00	359.30	5,709.0	3,275.4	-2.4	3,275.4	0.33	0.10	-0.31
8,931.0	90.90	359.20	5,707.4	3,372.4	-3.7	3,372.4	0.15	-0.10	-0.10
9,027.0	92.00	359.90	5,705.0	3,468.3	-4.5	3,468.3	1.36	1.15	0.73
9,123.0	91.80	359.70	5,701.8	3,564.3	-4.8	3,564.3	0.29	-0.21	-0.21
9,220.0	91.30	359.30	5,699.1	3,661.3	-5.6	3,661.3	0.66	-0.52	-0.41
9,316.0	90.90	358.70	5,697.3	3,757.2	-7.3	3,757.2	0.75	-0.42	-0.63
9,413.0	92.40	359.30	5,694.5	3,854.2	-9.0	3,854.2	1.67	1.55	0.62
9,510.0	92.00	358.90	5,690.8	3,951.1	-10.5	3,951.1	0.58	-0.41	-0.41
9,607.0	91.80	359.70	5,687.6	4,048.0	-11.7	4,048.0	0.85	-0.21	0.82
9,703.0	91.20	359.70	5,685.1	4,144.0	-12.2	4,144.0	0.63	-0.63	0.00
9,799.0	92.40	0.90	5,682.0	4,239.9	-11.7	4,239.9	1.77	1.25	1.25
9,896.0	92.90	0.60	5,677.6	4,336.8	-10.4	4,336.8	0.60	0.52	-0.31
9,993.0	92.30	0.70	5,673.2	4,433.7	-9.3	4,433.7	0.63	-0.62	0.10
10,089.0	90.60	1.10	5,670.7	4,529.7	-7.8	4,529.7	1.82	-1.77	0.42
10,185.0	91.20	0.90	5,669.2	4,625.6	-6.2	4,625.6	0.66	0.63	-0.21
10,282.0	90.90	1.20	5,667.4	4,722.6	-4.4	4,722.6	0.44	-0.31	0.31
10,379.0	92.00	0.60	5,665.0	4,819.6	-2.9	4,819.6	1.29	1.13	-0.62
10,482.0	93.50	0.50	5,660.0	4,922.4	-1.9	4,922.4	1.46	1.46	-0.10
Final MWD Survey									
10,536.0	93.50	0.50	5,656.8	4,976.3	-1.4	4,976.3	0.00	0.00	0.00



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 75' FNL, 330' FWL, Sec 22, T17S, R32E, Unit D
Project:	Lea County, NM	TVD Reference:	KB @ 4028.0usft (United 43)
Site:	Ivar the Boneless Federal #11H	MD Reference:	KB @ 4028.0usft (United 43)
Well:	SHL: 75' FNL, 330' FWL, Sec 22, T17S, R32E, Unit D	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 350' FWL, Sec 15, T17S, R32E, Unit D	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FNL, 350' 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)
Projection to Bit/TD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,050.0	5,049.2	-48.0	-0.6	TIE-IN to VES Gyro
10,482.0	5,660.0	4,922.4	-1.9	Final MWD Survey
10,536.0	5,656.8	4,976.3	-1.4	Projection to Bit/TD

Checked By: _____	Approved By: _____	Date: _____
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