

**VES**

VAUGHN ENERGY SERVICES

Company: Noble Energy  
 Lease/Well: Wells / 33-15  
 Location: S-15 T-5N R-63W  
 Rig Name: Production  
 State/County: Colorado / Weld County  
 Latitude: 40.30, Longitude: -104.42  
 GRID North is 0.70 Degrees East of True North  
 VS-Azi: 0.00 Degrees

**GTI**

GYRO TECHNOLOGIES, INC

## FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = Ground Level

## DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: inrun\_ed.ut

Minimum Curvature Method

Report Date/Time: 4/12/2011 / 12:50

Vaughn Energy Services  
 Denver, CO  
 720-215-1841  
 Robert Davis

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	0.89	206.47	100.00	-0.69	-0.34	-0.69	0.77	206.47	0.89
200.00	0.31	189.00	199.99	-1.65	-0.73	-1.65	1.81	203.86	0.59
300.00	0.85	292.74	299.99	-1.64	-1.46	-1.64	2.19	221.62	0.97
400.00	1.38	300.25	399.97	-0.75	-3.17	-0.75	3.26	256.75	0.55
500.00	2.15	295.30	499.92	0.66	-5.91	0.66	5.95	276.38	0.79
600.00	2.36	294.97	599.84	2.33	-9.48	2.33	9.76	283.83	0.21
700.00	2.68	302.03	699.74	4.44	-13.32	4.44	14.04	288.44	0.44
800.00	2.95	295.47	799.62	6.79	-17.63	6.79	18.89	291.06	0.42
900.00	3.30	296.92	899.48	9.20	-22.52	9.20	24.32	292.22	0.35
1000.00	3.52	295.60	999.30	11.82	-27.85	11.82	30.25	293.01	0.24
1100.00	3.84	293.36	1099.09	14.48	-33.69	14.48	36.66	293.26	0.35
1200.00	3.61	298.67	1198.88	17.31	-39.52	17.31	43.14	293.66	0.41
1300.00	3.69	297.25	1298.68	20.29	-45.14	20.29	49.49	294.21	0.12
1400.00	3.81	295.12	1398.47	23.18	-51.01	23.18	56.03	294.44	0.18
1500.00	3.94	297.23	1498.24	26.16	-57.07	26.16	62.79	294.63	0.19
1600.00	4.05	292.59	1597.99	29.09	-63.39	29.09	69.75	294.65	0.34
1700.00	4.22	300.95	1697.73	32.35	-69.82	32.35	76.95	294.86	0.63
1800.00	3.88	296.70	1797.48	35.76	-75.99	35.76	83.99	295.20	0.46
1900.00	3.42	290.77	1897.28	38.34	-81.81	38.34	90.34	295.11	0.59
2000.00	3.25	283.59	1997.11	40.06	-87.36	40.06	96.10	294.64	0.45
2100.00	3.27	283.35	2096.95	41.39	-92.89	41.39	101.69	294.02	0.02
2200.00	2.70	279.84	2196.81	42.45	-97.98	42.45	106.78	293.42	0.60
2300.00	2.69	272.76	2296.70	42.97	-102.65	42.97	111.28	292.71	0.33
2400.00	2.65	263.71	2396.60	42.83	-107.29	42.83	115.52	291.76	0.42
2500.00	3.01	262.97	2496.47	42.25	-112.20	42.25	119.89	290.64	0.36
2600.00	3.05	256.28	2596.33	41.30	-117.39	41.30	124.44	289.38	0.36
2700.00	3.15	255.17	2696.19	39.96	-122.63	39.96	128.97	288.05	0.12
2800.00	3.34	253.93	2796.03	38.45	-128.08	38.45	133.73	286.71	0.21
2900.00	3.45	253.46	2895.85	36.79	-133.77	36.79	138.74	285.38	0.11
3000.00	3.60	253.76	2995.66	35.05	-139.68	35.05	144.01	284.09	0.14
3100.00	3.50	246.93	3095.47	32.98	-145.50	32.98	149.19	282.77	0.43
3200.00	3.01	243.16	3195.31	30.60	-150.65	30.60	153.72	281.48	0.54
3300.00	2.77	253.63	3295.18	28.74	-155.30	28.74	157.94	280.48	0.58
3400.00	2.94	268.66	3395.06	27.99	-160.18	27.99	162.61	279.91	0.77

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
3500.00	3.12	264.27	3494.92	27.66	-165.46	27.66	167.75	279.49	0.29
3600.00	3.96	264.01	3594.73	27.03	-171.59	27.03	173.71	278.95	0.84
3700.00	3.58	261.31	3694.51	26.20	-178.11	26.20	180.03	278.37	0.42
3800.00	3.58	265.81	3794.32	25.50	-184.31	25.50	186.06	277.88	0.28
3900.00	3.68	271.17	3894.12	25.34	-190.64	25.34	192.31	277.57	0.35
4000.00	3.31	278.15	3993.93	25.81	-196.71	25.81	198.39	277.48	0.57
4100.00	3.43	290.16	4093.76	27.25	-202.37	27.25	204.20	277.67	0.71
4200.00	3.48	302.04	4193.58	29.89	-207.75	29.89	209.89	278.19	0.72
4300.00	3.97	310.00	4293.37	33.73	-212.98	33.73	215.63	279.00	0.71
4400.00	4.55	316.25	4393.09	38.82	-218.37	38.82	221.79	280.08	0.74
4500.00	5.26	323.85	4492.73	45.38	-223.81	45.38	228.37	281.46	0.96
4600.00	5.81	330.11	4592.26	53.47	-229.04	53.47	235.20	283.14	0.82
4700.00	6.14	337.32	4691.72	62.79	-233.62	62.79	241.91	285.04	0.82
4800.00	6.28	335.49	4791.13	72.70	-237.95	72.70	248.81	286.99	0.24
4900.00	6.02	334.03	4890.56	82.39	-242.52	82.39	256.13	288.76	0.30
5000.00	6.05	325.37	4990.00	91.45	-247.81	91.45	264.15	290.26	0.91
5100.00	5.51	317.99	5089.50	99.35	-254.02	99.35	272.76	291.36	0.92
5200.00	4.81	311.16	5189.09	105.68	-260.39	105.68	281.02	292.09	0.93
5300.00	4.03	305.23	5288.79	110.47	-266.42	110.47	288.41	292.52	0.91
5400.00	3.49	297.20	5388.58	113.89	-272.00	113.89	294.88	292.72	0.75
5500.00	3.23	304.27	5488.41	116.87	-277.03	116.87	300.67	292.87	0.49
5600.00	2.45	296.69	5588.28	119.41	-281.27	119.41	305.57	293.00	0.86
5700.00	1.65	281.12	5688.22	120.65	-284.60	120.65	309.12	292.97	0.97
5800.00	1.19	283.54	5788.19	121.17	-287.01	121.17	311.54	292.89	0.46
5900.00	1.14	261.76	5888.17	121.27	-289.01	121.27	313.42	292.76	0.44
6000.00	0.63	246.10	5988.16	120.91	-290.49	120.91	314.65	292.60	0.56
6100.00	0.36	308.03	6088.15	120.88	-291.24	120.88	315.33	292.54	0.56
6200.00	0.42	205.16	6188.15	120.74	-291.64	120.74	315.65	292.49	0.61
6300.00	0.35	219.54	6288.15	120.18	-291.99	120.18	315.75	292.37	0.11
6400.00	0.51	168.41	6388.15	119.51	-292.10	119.51	315.60	292.25	0.40
6500.00	0.29	99.39	6488.15	119.03	-291.76	119.03	315.11	292.19	0.49
6600.00	0.73	68.97	6588.14	119.22	-290.92	119.22	314.40	292.28	0.50

HORIZONTAL DISPLACEMENT IS 314.40 FEET AT 292.28 DEGREES									
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