

**VES**

VAUGHN ENERGY SERVICES

Company: Noble Energy  
 Lease/Well: Millage C / 12-4  
 Location: S-12 T-4N R-64W  
 Rig Name: Production  
 State/County: Colorado / Weld County  
 Latitude: 40.33, Longitude: -104.51  
 GRID North is 0.64 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: 3/17/2011 / 20:07

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	0.17	338.80	100.00	0.14	-0.05	0.14	0.15	338.80	0.17
200.00	0.23	90.96	200.00	0.27	0.10	0.27	0.29	19.77	0.33
300.00	0.31	81.40	300.00	0.31	0.57	0.31	0.64	61.59	0.09
400.00	0.48	84.99	400.00	0.38	1.25	0.38	1.31	72.98	0.18
500.00	0.77	98.30	499.99	0.32	2.34	0.32	2.36	82.09	0.31
600.00	0.87	118.93	599.98	-0.14	3.66	-0.14	3.67	92.19	0.31
700.00	0.87	114.43	699.97	-0.82	5.02	-0.82	5.08	99.29	0.07
800.00	1.21	120.46	799.95	-1.67	6.61	-1.67	6.82	104.15	0.36
900.00	0.96	115.30	899.93	-2.56	8.28	-2.56	8.67	107.18	0.26
1000.00	1.17	121.11	999.92	-3.45	9.91	-3.45	10.49	109.17	0.23
1100.00	1.23	124.70	1099.89	-4.58	11.67	-4.58	12.53	111.44	0.10
1200.00	1.42	111.97	1199.87	-5.66	13.70	-5.66	14.82	112.44	0.35
1300.00	1.37	114.88	1299.84	-6.62	15.93	-6.62	17.25	112.57	0.09
1400.00	1.56	118.03	1399.81	-7.76	18.21	-7.76	19.80	113.09	0.21
1500.00	1.87	126.86	1499.76	-9.38	20.72	-9.38	22.75	114.36	0.40
1600.00	1.76	149.30	1599.71	-11.68	22.81	-11.68	25.62	117.11	0.71
1700.00	1.00	154.64	1699.68	-13.78	23.96	-13.78	27.65	119.91	0.77
1800.00	1.08	146.41	1799.67	-15.36	24.86	-15.36	29.22	121.71	0.17
1900.00	0.41	183.23	1899.66	-16.50	25.36	-16.50	30.25	123.05	0.79
2000.00	0.20	230.90	1999.66	-16.96	25.20	-16.96	30.38	123.95	0.31
2100.00	0.40	309.84	2099.66	-16.85	24.80	-16.85	29.98	124.20	0.41
2200.00	0.59	353.44	2199.65	-16.12	24.47	-16.12	29.31	123.37	0.41
2300.00	0.35	322.06	2299.65	-15.37	24.23	-15.37	28.69	122.39	0.34
2400.00	0.32	16.06	2399.65	-14.86	24.12	-14.86	28.33	121.64	0.31
2500.00	0.48	357.53	2499.64	-14.18	24.18	-14.18	28.03	120.39	0.20
2600.00	0.62	332.17	2599.64	-13.29	23.91	-13.29	27.35	119.06	0.28
2700.00	0.87	304.91	2699.63	-12.37	23.03	-12.37	26.14	118.24	0.43
2800.00	0.96	295.27	2799.62	-11.58	21.65	-11.58	24.55	118.14	0.18
2900.00	0.68	306.84	2899.61	-10.86	20.41	-10.86	23.12	118.02	0.32
3000.00	0.93	313.90	2999.60	-9.95	19.35	-9.95	21.76	117.20	0.26
3100.00	0.94	317.63	3099.59	-8.78	18.22	-8.78	20.22	115.73	0.06
3200.00	1.35	314.98	3199.57	-7.34	16.83	-7.34	18.36	113.56	0.41
3300.00	1.32	329.47	3299.54	-5.51	15.41	-5.51	16.37	109.68	0.34
3400.00	1.27	334.48	3399.51	-3.52	14.35	-3.52	14.78	103.79	0.12

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	0.81	322.75	3499.50	-1.96	13.45	-1.96	13.59	98.29	0.50
3600.00	1.06	339.91	3599.48	-0.52	12.70	-0.52	12.71	92.36	0.37
3700.00	1.55	347.30	3699.46	1.67	12.08	1.67	12.20	82.15	0.51
3800.00	1.45	330.66	3799.42	4.09	11.16	4.09	11.89	69.89	0.44
3900.00	0.87	297.99	3899.40	5.55	9.88	5.55	11.33	60.68	0.86
4000.00	1.07	260.77	3999.39	5.75	8.29	5.75	10.09	55.25	0.65
4100.00	1.54	245.30	4099.36	5.04	6.15	5.04	7.95	50.66	0.58
4200.00	1.89	248.52	4199.32	3.88	3.40	3.88	5.15	41.22	0.37
4300.00	2.06	257.00	4299.26	2.87	0.11	2.87	2.87	2.18	0.34
4400.00	2.19	264.68	4399.19	2.29	-3.54	2.29	4.22	302.85	0.31
4500.00	2.31	269.72	4499.12	2.10	-7.45	2.10	7.74	285.73	0.23
4600.00	1.92	268.37	4599.05	2.04	-11.14	2.04	11.33	280.39	0.39
4700.00	1.57	269.82	4699.00	1.99	-14.19	1.99	14.33	277.98	0.35
4800.00	1.51	274.19	4798.96	2.08	-16.88	2.08	17.01	277.03	0.13
4900.00	1.30	279.43	4898.93	2.37	-19.31	2.37	19.46	276.98	0.24
5000.00	0.97	283.87	4998.91	2.75	-21.26	2.75	21.43	277.38	0.35
5100.00	0.67	294.51	5098.90	3.20	-22.60	3.20	22.83	278.05	0.34
5200.00	0.78	307.59	5198.90	3.85	-23.67	3.85	23.98	279.25	0.20
5300.00	0.55	350.12	5298.89	4.74	-24.30	4.74	24.75	281.04	0.53
5400.00	0.49	4.64	5398.89	5.64	-24.34	5.64	24.99	283.03	0.14
5500.00	0.16	351.58	5498.88	6.20	-24.33	6.20	25.11	284.30	0.33
5600.00	0.80	51.53	5598.88	6.77	-23.80	6.77	24.75	285.89	0.74
5700.00	0.80	45.84	5698.87	7.70	-22.75	7.70	24.02	288.69	0.08
5800.00	0.39	43.46	5798.86	8.43	-22.02	8.43	23.58	290.95	0.41
5900.00	0.58	42.34	5898.86	9.05	-21.44	9.05	23.27	292.88	0.19
6000.00	0.83	55.73	5998.85	9.83	-20.50	9.83	22.74	295.62	0.30
6100.00	0.82	51.86	6098.84	10.69	-19.34	10.69	22.09	298.93	0.06
6200.00	0.76	69.14	6198.83	11.37	-18.15	11.37	21.42	302.05	0.25
6300.00	0.74	77.05	6298.83	11.75	-16.90	11.75	20.58	304.80	0.10
6400.00	0.67	58.58	6398.82	12.20	-15.77	12.20	19.94	307.72	0.24
6500.00	0.53	66.16	6498.81	12.69	-14.85	12.69	19.53	310.52	0.16
6600.00	0.45	60.66	6598.81	13.07	-14.08	13.07	19.21	312.87	0.10

HORIZONTAL DISPLACEMENT IS 19.21 FEET AT 312.87 DEGREES									
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