

**VES**

VAUGHN ENERGY SERVICES

Company: Noble Energy  
 Lease/Well: Spike State D / 28-13  
 Location: S-28 T-3N R-65W

Rig Name: Production  
 State/County: Colorado / Weld County

Latitude: 40.19, Longitude: -104.56  
 GRID North is 0.60 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: 4/7/2011 / 13:00

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	0.45	15.91	100.00	0.38	0.11	0.38	0.39	15.91	0.45
200.00	0.41	7.79	200.00	1.11	0.26	1.11	1.14	13.36	0.07
300.00	0.45	11.91	299.99	1.85	0.39	1.85	1.89	12.01	0.05
400.00	0.61	14.69	399.99	2.74	0.61	2.74	2.81	12.50	0.17
500.00	0.67	340.41	499.98	3.81	0.55	3.81	3.85	8.18	0.38
600.00	0.73	317.34	599.98	4.83	-0.08	4.83	4.83	359.03	0.29
700.00	0.59	322.87	699.97	5.71	-0.83	5.71	5.77	351.77	0.15
800.00	0.74	12.31	799.96	6.75	-1.00	6.75	6.83	351.58	0.57
900.00	0.70	25.69	899.96	7.93	-0.60	7.93	7.96	355.69	0.17
1000.00	0.74	24.56	999.95	9.07	-0.06	9.07	9.07	359.60	0.04
1100.00	0.77	37.30	1099.94	10.20	0.61	10.20	10.22	3.45	0.17
1200.00	0.82	18.90	1199.93	11.42	1.26	11.42	11.48	6.28	0.26
1300.00	0.89	35.76	1299.92	12.72	1.94	12.72	12.87	8.68	0.26
1400.00	0.90	25.35	1399.91	14.06	2.73	14.06	14.32	10.99	0.16
1500.00	1.01	41.52	1499.89	15.43	3.65	15.43	15.85	13.31	0.29
1600.00	0.95	8.75	1599.88	16.91	4.36	16.91	17.46	14.47	0.56
1700.00	1.11	343.59	1699.86	18.65	4.21	18.65	19.12	12.73	0.48
1800.00	1.07	342.50	1799.84	20.47	3.66	20.47	20.80	10.14	0.04
1900.00	0.96	313.69	1899.83	21.95	2.77	21.95	22.12	7.20	0.52
2000.00	0.68	310.75	1999.82	22.91	1.71	22.91	22.98	4.27	0.28
2100.00	0.79	307.56	2099.81	23.72	0.72	23.72	23.73	1.73	0.11
2200.00	0.71	292.69	2199.80	24.38	-0.40	24.38	24.38	359.07	0.21
2300.00	0.63	304.88	2299.80	24.93	-1.42	24.93	24.97	356.75	0.16
2400.00	0.39	345.57	2399.79	25.58	-1.95	25.58	25.65	355.64	0.42
2500.00	0.25	342.77	2499.79	26.12	-2.10	26.12	26.20	355.40	0.14
2600.00	0.18	5.49	2599.79	26.49	-2.15	26.49	26.57	355.36	0.11
2700.00	0.12	309.50	2699.79	26.71	-2.22	26.71	26.80	355.25	0.15
2800.00	0.22	5.05	2799.79	26.97	-2.28	26.97	27.07	355.16	0.18
2900.00	0.07	81.24	2899.79	27.18	-2.20	27.18	27.26	355.36	0.22
3000.00	0.21	98.23	2999.79	27.16	-1.96	27.16	27.23	355.87	0.15
3100.00	0.37	141.03	3099.79	26.88	-1.57	26.88	26.93	356.65	0.26
3200.00	0.50	132.98	3199.78	26.33	-1.05	26.33	26.35	357.72	0.14
3300.00	0.63	153.36	3299.78	25.54	-0.48	25.54	25.54	358.92	0.24
3400.00	0.75	184.80	3399.77	24.39	-0.29	24.39	24.39	359.32	0.39

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	0.51	182.28	3499.77	23.29	-0.36	23.29	23.29	359.11	0.24
3600.00	0.66	203.83	3599.76	22.32	-0.61	22.32	22.33	358.43	0.26
3700.00	0.54	188.41	3699.76	21.32	-0.91	21.32	21.34	357.55	0.20
3800.00	0.52	215.81	3799.75	20.49	-1.25	20.49	20.53	356.52	0.25
3900.00	0.70	248.41	3899.75	19.90	-2.08	19.90	20.01	354.03	0.38
4000.00	0.69	245.78	3999.74	19.43	-3.20	19.43	19.69	350.65	0.03
4100.00	1.06	250.40	4099.73	18.87	-4.62	18.87	19.42	346.24	0.38
4200.00	1.09	253.02	4199.71	18.28	-6.40	18.28	19.37	340.70	0.05
4300.00	0.99	252.80	4299.69	17.75	-8.13	17.75	19.52	335.39	0.10
4400.00	1.03	254.55	4399.68	17.25	-9.82	17.25	19.85	330.36	0.06
4500.00	1.00	220.31	4499.66	16.35	-11.25	16.35	19.85	325.46	0.60
4600.00	0.94	229.21	4599.65	15.14	-12.44	15.14	19.60	320.60	0.16
4700.00	0.05	284.24	4699.64	14.62	-13.10	14.62	19.63	318.14	0.91
4800.00	0.29	359.62	4799.64	14.88	-13.14	14.88	19.85	318.56	0.28
4900.00	1.08	29.75	4899.64	15.95	-12.67	15.95	20.37	321.54	0.84
5000.00	1.44	37.64	4999.61	17.76	-11.44	17.76	21.13	327.22	0.40
5100.00	1.16	30.60	5099.59	19.63	-10.16	19.63	22.10	332.65	0.32
5200.00	0.88	59.74	5199.57	20.89	-8.97	20.89	22.74	336.76	0.58
5300.00	0.54	18.06	5299.56	21.73	-8.17	21.73	23.21	339.40	0.60
5400.00	0.62	358.64	5399.56	22.71	-8.03	22.71	24.09	340.52	0.21
5500.00	0.93	352.94	5499.55	24.05	-8.15	24.05	25.40	341.29	0.33
5600.00	1.12	310.02	5599.53	25.49	-8.99	25.49	27.03	340.57	0.77
5700.00	1.49	286.23	5699.51	26.48	-10.98	26.48	28.66	337.47	0.65
5800.00	1.87	286.61	5799.47	27.30	-13.79	27.30	30.59	333.20	0.38
5900.00	2.80	279.27	5899.38	28.16	-17.76	28.16	33.29	327.77	0.98
6000.00	3.51	286.69	5999.23	29.44	-23.10	29.44	37.42	321.87	0.82
6100.00	3.19	298.89	6099.06	31.66	-28.47	31.66	42.58	318.03	0.78
6200.00	2.62	311.44	6198.93	34.52	-32.62	34.52	47.49	316.62	0.85
6300.00	2.28	332.89	6298.84	37.80	-35.24	37.80	51.68	317.00	0.97
6400.00	1.74	355.31	6398.78	41.08	-36.27	41.08	54.80	318.55	0.94
6500.00	0.89	17.14	6498.76	43.33	-36.17	43.33	56.44	320.15	0.97
6600.00	0.47	314.52	6598.75	44.36	-36.24	44.36	57.28	320.75	0.79
6700.00	0.33	272.42	6698.75	44.66	-36.82	44.66	57.88	320.50	0.32
6800.00	0.23	267.03	6798.75	44.66	-37.30	44.66	58.19	320.13	0.10
6900.00	0.25	182.21	6898.75	44.43	-37.51	44.43	58.14	319.83	0.33

<div> HORIZONTAL DISPLACEMENT IS  58.14 FEET AT 319.83 DEGREES </div>
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