

**VES**

VAUGHN ENERGY SERVICES

Company: Noble Energy  
 Lease/Well: Markus F / 28-25  
 Location: S-28 T-5N R-65W  
 Rig Name: Production  
 State/County: Colorado / Weld County  
 Latitude: 40.37, Longitude: -104.67  
 GRID North is 0.54 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: 4/20/2011 / 11:24

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	0.57	334.97	100.00	0.45	-0.21	0.45	0.50	334.97	0.57
200.00	0.56	332.68	199.99	1.33	-0.64	1.33	1.48	334.21	0.02
300.00	0.56	334.91	299.99	2.21	-1.08	2.21	2.46	334.04	0.02
400.00	0.45	2.51	399.98	3.05	-1.27	3.05	3.30	337.43	0.26
500.00	0.40	90.75	499.98	3.44	-0.90	3.44	3.56	345.26	0.59
600.00	0.49	102.03	599.98	3.35	-0.14	3.35	3.35	357.57	0.13
700.00	0.50	101.77	699.98	3.17	0.70	3.17	3.24	12.45	0.01
800.00	0.47	117.58	799.97	2.89	1.49	2.89	3.25	27.22	0.14
900.00	0.86	168.65	899.97	1.97	2.00	1.97	2.80	45.45	0.67
1000.00	3.43	193.74	999.89	-1.67	1.43	-1.67	2.20	139.40	2.67
1100.00	5.11	203.19	1099.61	-8.67	-1.03	-8.67	8.74	186.77	1.82
1200.00	5.95	202.61	1199.14	-17.56	-4.78	-17.56	18.19	195.22	0.84
1300.00	7.30	197.62	1298.47	-28.39	-8.69	-28.39	29.70	197.02	1.46
1400.00	9.20	197.14	1397.43	-42.09	-12.97	-42.09	44.05	197.13	1.91
1500.00	11.39	203.98	1495.82	-58.76	-19.34	-58.76	61.86	198.22	2.50
1600.00	13.42	205.11	1593.48	-78.29	-28.28	-78.29	83.24	199.86	2.05
1700.00	15.27	204.37	1690.36	-100.79	-38.64	-100.79	107.95	200.98	1.85
1800.00	15.94	206.25	1786.68	-125.10	-50.15	-125.10	134.78	201.85	0.84
1900.00	14.77	208.63	1883.11	-148.60	-62.33	-148.60	161.15	202.76	1.32
2000.00	13.60	205.18	1980.06	-170.43	-73.44	-170.43	185.58	203.31	1.45
2100.00	14.07	203.93	2077.16	-192.18	-83.37	-192.18	209.49	203.45	0.56
2200.00	14.60	207.44	2174.04	-214.48	-94.12	-214.48	234.22	203.69	1.02
2300.00	13.73	205.58	2271.00	-236.37	-105.05	-236.37	258.66	203.96	0.99
2400.00	14.01	204.28	2368.09	-258.10	-115.15	-258.10	282.62	204.04	0.42
2500.00	14.11	207.45	2465.09	-279.95	-125.74	-279.95	306.90	204.19	0.78
2600.00	13.93	210.08	2562.11	-301.19	-137.40	-301.19	331.05	204.52	0.66
2700.00	14.74	214.37	2659.00	-322.11	-150.61	-322.11	355.58	205.06	1.33
2800.00	14.91	212.60	2755.67	-343.45	-164.73	-343.45	380.91	205.62	0.49
2900.00	13.42	208.45	2852.63	-364.50	-177.19	-364.50	405.28	205.93	1.81
3000.00	13.68	202.23	2949.85	-385.65	-187.19	-385.65	428.68	205.89	1.48
3100.00	13.65	205.83	3047.02	-407.22	-196.81	-407.22	452.28	205.79	0.85
3200.00	12.85	208.19	3144.36	-427.64	-207.20	-427.64	475.19	205.85	0.97
3300.00	13.22	204.89	3241.79	-447.81	-217.26	-447.81	497.73	205.88	0.83
3400.00	13.39	207.21	3339.11	-468.47	-227.37	-468.47	520.73	205.89	0.56

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	13.37	204.90	3436.39	-489.26	-237.53	-489.26	543.87	205.90	0.54
3600.00	13.43	208.79	3533.67	-509.92	-248.00	-509.92	567.03	205.94	0.90
3700.00	14.21	205.47	3630.78	-531.19	-258.87	-531.19	590.91	205.98	1.11
3800.00	15.05	205.41	3727.53	-553.99	-269.71	-553.99	616.16	205.96	0.84
3900.00	15.13	206.12	3824.09	-577.43	-281.03	-577.43	642.19	205.95	0.20
4000.00	14.88	208.43	3920.68	-600.44	-292.89	-600.44	668.07	206.00	0.65
4100.00	14.09	209.41	4017.50	-622.34	-304.98	-622.34	693.05	206.11	0.83
4200.00	13.82	214.93	4114.55	-642.74	-317.80	-642.74	717.02	206.31	1.36
4300.00	13.58	208.48	4211.71	-662.86	-330.24	-662.86	740.57	206.48	1.55
4400.00	13.34	212.05	4308.96	-682.96	-341.96	-682.96	763.79	206.60	0.87
4500.00	13.07	209.89	4406.32	-702.54	-353.72	-702.54	786.56	206.72	0.56
4600.00	13.33	208.46	4503.68	-722.48	-364.84	-722.48	809.38	206.79	0.42
4700.00	13.44	208.15	4600.96	-742.87	-375.82	-742.87	832.52	206.84	0.13
4800.00	13.96	201.23	4698.12	-764.36	-385.68	-764.36	856.15	206.77	1.72
4900.00	13.36	201.94	4795.29	-786.33	-394.36	-786.33	879.68	206.63	0.62
5000.00	12.06	205.15	4892.84	-806.50	-403.12	-806.50	901.64	206.56	1.48
5100.00	10.87	206.29	4990.84	-824.42	-411.74	-824.42	921.51	206.54	1.22
5200.00	9.00	212.20	5089.34	-839.48	-420.08	-839.48	938.72	206.58	2.13
5300.00	7.95	213.84	5188.25	-851.84	-428.10	-851.84	953.36	206.68	1.08
5400.00	5.53	217.12	5287.55	-861.42	-434.86	-861.42	964.96	206.79	2.45
5500.00	3.22	226.45	5387.25	-867.20	-439.80	-867.20	972.34	206.89	2.41
5600.00	1.99	231.60	5487.15	-870.21	-443.19	-870.21	976.57	206.99	1.25
5700.00	1.38	250.90	5587.11	-871.68	-445.69	-871.68	979.02	207.08	0.82
5800.00	1.03	277.75	5687.08	-871.96	-447.73	-871.96	980.19	207.18	0.66
5900.00	1.42	337.18	5787.06	-870.69	-449.10	-870.69	979.69	207.28	1.26
6000.00	2.22	338.23	5887.01	-867.75	-450.30	-867.75	977.63	207.43	0.79
6100.00	3.57	345.09	5986.88	-862.95	-451.82	-862.95	974.07	207.64	1.40
6200.00	5.35	354.31	6086.58	-855.30	-453.08	-855.30	967.90	207.91	1.91
6300.00	2.21	350.54	6186.35	-848.76	-453.86	-848.76	962.49	208.14	3.14
6400.00	1.02	320.62	6286.31	-846.17	-454.74	-846.17	960.62	208.25	1.42
6500.00	0.56	294.24	6386.30	-845.28	-455.76	-845.28	960.32	208.33	0.57
6600.00	0.19	249.59	6486.30	-845.14	-456.36	-845.14	960.48	208.37	0.45
6700.00	0.47	165.62	6586.30	-845.59	-456.41	-845.59	960.91	208.36	0.49
6800.00	0.86	167.90	6686.29	-846.72	-456.16	-846.72	961.78	208.31	0.39
6900.00	1.18	195.01	6786.27	-848.45	-456.27	-848.45	963.35	208.27	0.57
7000.00	0.96	210.60	6886.26	-850.16	-456.96	-850.16	965.19	208.26	0.36
7100.00	1.03	190.38	6986.24	-851.77	-457.55	-851.77	966.88	208.24	0.36
HORIZONTAL DISPLACEMENT IS 966.88 FEET AT 208.24 DEGREES									