

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy
 Lease/Well: Riva Red / 31-3
 Location: S-31 T-3N R-64W

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

Latitude: 40.19, Longitude: -104.61
 GRID North is 0.58 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: 2/23/2011 / 11:32

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	0.52	95.72	100.00	-0.05	0.45	-0.05	0.45	95.72	0.52
200.00	0.26	81.18	200.00	-0.06	1.12	-0.06	1.12	92.86	0.28
300.00	0.42	68.91	299.99	0.11	1.69	0.11	1.69	86.27	0.18
400.00	0.38	76.83	399.99	0.32	2.35	0.32	2.37	82.32	0.07
500.00	0.11	26.39	499.99	0.48	2.71	0.48	2.75	80.02	0.32
600.00	0.16	40.30	599.99	0.67	2.84	0.67	2.92	76.72	0.06
700.00	0.24	95.91	699.99	0.76	3.14	0.76	3.23	76.40	0.20
800.00	0.04	54.19	799.99	0.76	3.37	0.76	3.46	77.32	0.21
900.00	0.17	26.91	899.99	0.91	3.47	0.91	3.59	75.26	0.14
1000.00	0.10	44.82	999.99	1.11	3.60	1.11	3.77	72.86	0.08
1100.00	0.19	26.35	1099.99	1.32	3.74	1.32	3.97	70.51	0.10
1200.00	0.35	16.75	1199.99	1.77	3.90	1.77	4.28	65.64	0.17
1300.00	0.54	35.16	1299.99	2.45	4.26	2.45	4.92	60.14	0.24
1400.00	0.37	29.59	1399.98	3.12	4.70	3.12	5.64	56.42	0.17
1500.00	0.56	36.11	1499.98	3.80	5.15	3.80	6.39	53.58	0.19
1600.00	0.80	45.10	1599.97	4.69	5.93	4.69	7.56	51.68	0.26
1700.00	0.95	49.21	1699.96	5.72	7.05	5.72	9.08	50.95	0.16
1800.00	1.10	48.89	1799.94	6.89	8.40	6.89	10.86	50.64	0.16
1900.00	1.40	55.68	1899.92	8.21	10.13	8.21	13.04	50.98	0.34
2000.00	1.63	66.20	1999.88	9.47	12.44	9.47	15.64	52.72	0.36
2100.00	1.85	78.48	2099.84	10.37	15.33	10.37	18.50	55.92	0.43
2200.00	1.81	92.60	2199.79	10.62	18.48	10.62	21.32	60.12	0.45
2300.00	1.85	94.73	2299.74	10.42	21.67	10.42	24.04	64.33	0.08
2400.00	1.98	86.54	2399.68	10.39	25.00	10.39	27.08	67.44	0.30
2500.00	1.87	94.56	2499.63	10.36	28.35	10.36	30.19	69.93	0.29
2600.00	1.99	103.11	2599.57	9.84	31.67	9.84	33.16	72.74	0.31
2700.00	2.09	114.79	2699.51	8.68	35.01	8.68	36.07	76.07	0.43
2800.00	2.03	128.73	2799.44	6.81	38.05	6.81	38.65	79.86	0.50
2900.00	2.04	134.00	2899.38	4.46	40.71	4.46	40.96	83.75	0.19
3000.00	2.21	128.50	2999.31	2.03	43.50	2.03	43.55	87.33	0.26
3100.00	2.15	137.68	3099.24	-0.56	46.27	-0.56	46.27	90.69	0.35
3200.00	1.92	163.33	3199.18	-3.55	48.01	-3.55	48.14	94.23	0.93
3300.00	1.70	189.37	3299.13	-6.62	48.25	-6.62	48.70	97.81	0.84
3400.00	1.34	191.10	3399.09	-9.24	47.78	-9.24	48.67	100.94	0.36

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	1.45	220.71	3499.07	-11.34	46.73	-11.34	48.09	103.64	0.72
3600.00	1.08	259.83	3599.04	-12.47	44.99	-12.47	46.68	105.49	0.91
3700.00	1.79	283.48	3699.01	-12.27	42.55	-12.27	44.28	106.09	0.91
3800.00	2.72	289.45	3798.93	-11.11	38.79	-11.11	40.35	105.99	0.96
3900.00	3.53	298.81	3898.78	-8.84	33.85	-8.84	34.98	104.63	0.96
4000.00	4.18	304.76	3998.56	-5.28	28.15	-5.28	28.64	100.61	0.76
4100.00	4.39	314.10	4098.28	-0.53	22.41	-0.53	22.41	91.36	0.73
4200.00	4.69	314.02	4197.97	4.97	16.72	4.97	17.44	73.43	0.30
4300.00	5.19	320.75	4297.59	11.32	10.92	11.32	15.72	43.98	0.76
4400.00	5.48	327.90	4397.16	18.86	5.52	18.86	19.65	16.31	0.73
4500.00	5.63	324.05	4496.69	26.88	0.10	26.88	26.88	0.22	0.40
4600.00	5.44	324.58	4596.23	34.71	-5.52	34.71	35.15	350.96	0.19
4700.00	5.29	326.94	4695.79	42.44	-10.78	42.44	43.79	345.74	0.26
4800.00	5.42	327.72	4795.35	50.30	-15.82	50.30	52.73	342.54	0.14
4900.00	4.75	335.07	4894.96	58.04	-20.09	58.04	61.42	340.91	0.93
5000.00	4.36	344.51	4994.64	65.46	-22.85	65.46	69.33	340.76	0.84
5100.00	4.58	355.46	5094.34	73.10	-24.18	73.10	76.99	341.70	0.88
5200.00	4.21	6.01	5194.05	80.73	-24.11	80.73	84.25	343.37	0.89
5300.00	3.44	15.32	5293.83	87.27	-22.93	87.27	90.23	345.28	0.99
5400.00	2.67	23.64	5393.69	92.30	-21.21	92.30	94.70	347.06	0.88
5500.00	3.06	33.97	5493.56	96.65	-18.78	96.65	98.46	349.00	0.65
5600.00	2.53	41.16	5593.44	100.52	-15.84	100.52	101.76	351.05	0.64
5700.00	2.10	55.95	5693.36	103.21	-12.87	103.21	104.01	352.89	0.73
5800.00	1.27	67.21	5793.32	104.66	-10.33	104.66	105.17	354.36	0.89
5900.00	0.88	87.05	5893.30	105.13	-8.54	105.13	105.48	355.36	0.54
6000.00	0.34	44.76	5993.29	105.38	-7.56	105.38	105.66	355.90	0.67
6100.00	1.05	347.17	6093.29	106.50	-7.55	106.50	106.76	355.94	0.92
6200.00	0.94	325.84	6193.27	108.07	-8.22	108.07	108.38	355.65	0.39
6300.00	0.71	324.79	6293.26	109.26	-9.04	109.26	109.63	355.27	0.23
6400.00	1.21	280.58	6393.25	109.96	-10.44	109.96	110.46	354.58	0.86
6500.00	1.81	256.37	6493.21	109.78	-13.02	109.78	110.55	353.24	0.87
6600.00	2.19	240.86	6593.15	108.48	-16.23	108.48	109.69	351.49	0.66
6700.00	2.31	227.56	6693.08	106.19	-19.38	106.19	107.95	349.66	0.53
6800.00	2.03	238.59	6793.01	103.91	-22.38	103.91	106.29	347.84	0.50
6900.00	1.71	227.69	6892.95	101.98	-25.00	101.98	105.00	346.23	0.48
7000.00	1.39	216.86	6992.92	100.01	-26.82	100.01	103.55	344.99	0.43
HORIZONTAL DISPLACEMENT IS 103.55 FEET AT 344.99 DEGREES									