

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy
 Lease/Well: Patriot B / 16-7
 Location: S-16 T-5N R-64W
 Rig Name: Production
 State/County: Colorado / Weld County
 Latitude: 40.40, Longitude: -104.55
 GRID North is 0.61 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: outrun_ed.ut

Minimum Curvature Method

Report Date/Time: 3/7/2011 / 08:22

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	0.37	302.35	100.00	0.17	-0.28	0.17	0.33	302.35	0.37
200.00	0.33	306.79	200.00	0.52	-0.78	0.52	0.94	303.72	0.05
300.00	0.15	76.15	300.00	0.73	-0.89	0.73	1.15	309.47	0.45
400.00	0.34	71.14	400.00	0.86	-0.47	0.86	0.98	331.04	0.19
500.00	0.16	125.99	500.00	0.87	-0.08	0.87	0.88	354.49	0.28
600.00	0.27	117.53	599.99	0.69	0.23	0.69	0.72	18.92	0.12
700.00	0.23	150.07	699.99	0.40	0.54	0.40	0.68	53.40	0.15
800.00	0.04	347.69	799.99	0.27	0.64	0.27	0.69	67.35	0.27
900.00	0.16	188.14	899.99	0.16	0.61	0.16	0.63	75.24	0.20
1000.00	0.15	253.56	999.99	-0.01	0.46	-0.01	0.46	91.81	0.17
1100.00	0.13	233.51	1099.99	-0.12	0.25	-0.12	0.28	115.43	0.05
1200.00	0.17	255.77	1199.99	-0.22	0.02	-0.22	0.22	175.59	0.07
1300.00	0.22	235.45	1299.99	-0.37	-0.28	-0.37	0.46	217.57	0.09
1400.00	0.19	84.01	1399.99	-0.46	-0.27	-0.46	0.53	210.76	0.40
1500.00	0.27	103.58	1499.99	-0.50	0.13	-0.50	0.51	165.50	0.11
1600.00	0.40	203.73	1599.99	-0.87	0.22	-0.87	0.90	165.62	0.52
1700.00	0.56	231.58	1699.99	-1.49	-0.30	-1.49	1.52	191.38	0.28
1800.00	0.54	242.46	1799.98	-2.01	-1.10	-2.01	2.29	208.64	0.11
1900.00	0.31	286.30	1899.98	-2.15	-1.77	-2.15	2.78	219.42	0.38
2000.00	0.39	234.57	1999.98	-2.27	-2.30	-2.27	3.23	225.36	0.31
2100.00	0.59	271.81	2099.97	-2.45	-3.09	-2.45	3.95	231.58	0.37
2200.00	0.55	269.69	2199.97	-2.44	-4.09	-2.44	4.76	239.19	0.04
2300.00	0.72	283.94	2299.96	-2.29	-5.19	-2.29	5.67	246.17	0.23
2400.00	0.80	286.54	2399.95	-1.94	-6.47	-1.94	6.75	253.31	0.09
2500.00	0.38	296.90	2499.95	-1.59	-7.43	-1.59	7.60	257.91	0.44
2600.00	0.41	287.24	2599.95	-1.34	-8.07	-1.34	8.18	260.59	0.08
2700.00	0.39	283.14	2699.94	-1.15	-8.74	-1.15	8.82	262.49	0.04
2800.00	0.23	335.70	2799.94	-0.89	-9.16	-0.89	9.20	264.42	0.31
2900.00	0.30	298.28	2899.94	-0.59	-9.47	-0.59	9.49	266.45	0.19
3000.00	0.16	353.88	2999.94	-0.32	-9.72	-0.32	9.73	268.12	0.25
3100.00	0.39	316.26	3099.94	0.07	-9.97	0.07	9.98	270.41	0.28
3200.00	0.71	354.34	3199.93	0.94	-10.27	0.94	10.32	275.22	0.47
3300.00	1.24	337.52	3299.92	2.56	-10.75	2.56	11.05	283.40	0.60
3400.00	1.76	313.66	3399.89	4.62	-12.27	4.62	13.12	290.64	0.80

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	1.94	310.91	3499.83	6.79	-14.67	6.79	16.16	294.85	0.21
3600.00	1.77	302.99	3599.78	8.74	-17.24	8.74	19.33	296.89	0.31
3700.00	1.52	298.50	3699.74	10.22	-19.70	10.22	22.19	297.41	0.29
3800.00	0.95	278.10	3799.72	10.96	-21.69	10.96	24.30	296.82	0.71
3900.00	0.67	260.67	3899.71	10.99	-23.08	10.99	25.56	295.45	0.37
4000.00	0.61	245.01	3999.70	10.67	-24.14	10.67	26.39	293.84	0.18
4100.00	0.60	182.61	4099.70	9.92	-24.64	9.92	26.57	291.92	0.63
4200.00	0.60	178.12	4199.69	8.87	-24.65	8.87	26.20	289.79	0.05
4300.00	0.75	163.81	4299.68	7.72	-24.45	7.72	25.64	287.53	0.22
4400.00	0.93	194.30	4399.67	6.31	-24.47	6.31	25.27	284.46	0.47
4500.00	1.36	218.45	4499.65	4.59	-25.41	4.59	25.82	280.25	0.64
4600.00	1.03	193.82	4599.63	2.80	-26.36	2.80	26.51	276.06	0.60
4700.00	1.09	192.29	4699.62	1.00	-26.78	1.00	26.79	272.13	0.07
4800.00	1.09	193.36	4799.60	-0.86	-27.20	-0.86	27.21	268.19	0.02
4900.00	0.98	186.63	4899.58	-2.63	-27.52	-2.63	27.64	264.54	0.17
5000.00	0.66	167.55	4999.57	-4.04	-27.49	-4.04	27.79	261.64	0.41
5100.00	0.53	155.83	5099.57	-5.03	-27.17	-5.03	27.64	259.51	0.18
5200.00	0.92	117.12	5199.56	-5.82	-26.27	-5.82	26.91	257.51	0.60
5300.00	0.79	125.84	5299.55	-6.59	-25.00	-6.59	25.85	255.23	0.18
5400.00	0.84	156.91	5399.54	-7.67	-24.15	-7.67	25.34	252.38	0.44
5500.00	0.78	154.51	5499.53	-8.96	-23.57	-8.96	25.21	249.18	0.07
5600.00	0.59	108.26	5599.52	-9.73	-22.79	-9.73	24.78	246.87	0.56
5700.00	0.08	87.65	5699.52	-9.89	-22.23	-9.89	24.33	246.01	0.51
5800.00	0.57	50.02	5799.52	-9.57	-21.77	-9.57	23.78	246.28	0.51
5900.00	0.50	115.08	5899.51	-9.43	-20.99	-9.43	23.01	245.81	0.58
6000.00	0.48	108.95	5999.51	-9.75	-20.20	-9.75	22.43	244.22	0.06
6100.00	0.45	126.39	6099.51	-10.12	-19.48	-10.12	21.96	242.54	0.15
6200.00	0.43	114.97	6199.50	-10.52	-18.83	-10.52	21.56	240.81	0.09
6300.00	0.74	119.67	6299.50	-10.99	-17.93	-10.99	21.03	238.48	0.31
6400.00	0.75	118.66	6399.49	-11.63	-16.79	-11.63	20.42	235.29	0.02
6500.00	0.37	118.96	6499.49	-12.10	-15.93	-12.10	20.00	232.77	0.38
6600.00	0.58	102.32	6599.48	-12.37	-15.14	-12.37	19.55	230.76	0.25
6700.00	0.77	118.98	6699.48	-12.80	-14.06	-12.80	19.02	227.69	0.27
6770.00	0.70	137.47	6769.47	-13.34	-13.36	-13.34	18.88	225.04	0.35
HORIZONTAL DISPLACEMENT IS 18.88 FEET AT 225.04 DEGREES									