

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy

Lease/Well: Patriot B / 16-22

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: inrun_ed.ut

Minimum Curvature Method

Report Date/Time: 3/9/2011 / 19:36

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	0.39	356.04	100.00	0.34	-0.02	0.34	0.34	356.04	0.39
200.00	0.39	12.85	200.00	1.01	0.03	1.01	1.01	1.60	0.11
300.00	0.23	32.32	300.00	1.52	0.21	1.52	1.53	7.98	0.19
400.00	0.13	116.06	400.00	1.64	0.42	1.64	1.69	14.52	0.25
500.00	0.57	160.53	499.99	1.12	0.69	1.12	1.32	31.82	0.49
600.00	0.30	125.65	599.99	0.49	1.07	0.49	1.18	65.30	0.37
700.00	0.39	140.22	699.99	0.08	1.50	0.08	1.51	86.95	0.12
800.00	0.46	108.23	799.99	-0.30	2.10	-0.30	2.12	98.26	0.24
900.00	0.39	157.48	899.98	-0.75	2.61	-0.75	2.72	105.98	0.36
1000.00	0.55	148.53	999.98	-1.47	2.99	-1.47	3.34	116.21	0.17
1100.00	0.56	139.68	1099.98	-2.25	3.56	-2.25	4.21	122.34	0.09
1200.00	0.45	142.13	1199.97	-2.94	4.12	-2.94	5.06	125.51	0.11
1300.00	0.61	167.80	1299.97	-3.77	4.47	-3.77	5.85	130.12	0.28
1400.00	0.53	157.67	1399.96	-4.71	4.76	-4.71	6.70	134.72	0.13
1500.00	0.65	171.50	1499.96	-5.70	5.02	-5.70	7.59	138.64	0.19
1600.00	0.64	176.65	1599.95	-6.82	5.14	-6.82	8.54	143.01	0.06
1700.00	0.58	190.16	1699.95	-7.87	5.08	-7.87	9.37	147.17	0.16
1800.00	0.71	179.57	1799.94	-8.99	4.99	-8.99	10.28	150.93	0.18
1900.00	0.46	170.72	1899.93	-10.00	5.06	-10.00	11.21	153.14	0.26
2000.00	0.47	157.49	1999.93	-10.78	5.29	-10.78	12.00	153.87	0.11
2100.00	0.76	151.09	2099.92	-11.74	5.76	-11.74	13.07	153.84	0.29
2200.00	0.70	114.02	2199.92	-12.56	6.64	-12.56	14.21	152.14	0.47
2300.00	0.41	110.95	2299.91	-12.94	7.53	-12.94	14.97	149.79	0.30
2400.00	0.74	137.85	2399.91	-13.55	8.30	-13.55	15.89	148.51	0.42
2500.00	0.75	99.26	2499.90	-14.13	9.38	-14.13	16.96	146.43	0.49
2600.00	0.50	129.61	2599.89	-14.51	10.36	-14.51	17.83	144.49	0.41
2700.00	0.30	83.51	2699.89	-14.76	10.95	-14.76	18.38	143.42	0.36
2800.00	0.52	107.93	2799.89	-14.87	11.65	-14.87	18.89	141.93	0.28
2900.00	0.52	107.67	2899.88	-15.15	12.51	-15.15	19.65	140.44	0.00
3000.00	0.60	59.37	2999.88	-15.02	13.39	-15.02	20.12	138.27	0.46
3100.00	0.70	98.94	3099.87	-14.84	14.45	-14.84	20.71	135.77	0.45
3200.00	0.53	154.82	3199.87	-15.36	15.25	-15.36	21.64	135.21	0.60
3300.00	1.26	195.46	3299.86	-16.84	15.15	-16.84	22.65	138.01	0.92
3400.00	1.45	188.27	3399.83	-19.15	14.68	-19.15	24.13	142.53	0.26

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	1.52	193.87	3499.80	-21.70	14.18	-21.70	25.92	146.84	0.16
3600.00	1.49	192.30	3599.76	-24.26	13.58	-24.26	27.81	150.77	0.05
3700.00	1.64	196.62	3699.72	-26.91	12.89	-26.91	29.84	154.40	0.18
3800.00	1.71	195.42	3799.68	-29.71	12.09	-29.71	32.08	157.86	0.09
3900.00	1.69	188.01	3899.64	-32.62	11.48	-32.62	34.58	160.60	0.22
4000.00	1.93	174.32	3999.59	-35.76	11.45	-35.76	37.55	162.25	0.49
4100.00	2.09	150.55	4099.53	-39.02	12.51	-39.02	40.98	162.23	0.84
4200.00	2.17	141.71	4199.46	-42.10	14.58	-42.10	44.56	160.90	0.34
4300.00	1.35	136.99	4299.41	-44.45	16.56	-44.45	47.44	159.57	0.83
4400.00	0.47	130.79	4399.40	-45.59	17.68	-45.59	48.90	158.80	0.88
4500.00	0.38	96.60	4499.39	-45.90	18.32	-45.90	49.42	158.24	0.27
4600.00	1.06	29.95	4599.39	-45.14	19.11	-45.14	49.01	157.06	0.97
4700.00	1.82	6.01	4699.36	-42.76	19.73	-42.76	47.09	155.23	0.96
4800.00	2.75	359.52	4799.27	-38.78	19.88	-38.78	43.58	152.86	0.96
4900.00	3.57	351.90	4899.12	-33.30	19.42	-33.30	38.55	149.75	0.92
5000.00	4.42	348.11	4998.88	-26.44	18.19	-26.44	32.09	145.48	0.89
5100.00	4.27	337.23	5098.59	-19.24	15.95	-19.24	24.99	140.33	0.84
5200.00	3.86	335.99	5198.34	-12.74	13.15	-12.74	18.30	134.10	0.42
5300.00	3.17	325.88	5298.15	-7.38	10.23	-7.38	12.61	125.81	0.92
5400.00	2.39	314.65	5398.04	-3.63	7.20	-3.63	8.06	116.74	0.95
5500.00	1.50	322.91	5497.98	-1.12	4.93	-1.12	5.05	102.82	0.93
5600.00	0.82	324.17	5597.96	0.50	3.72	0.50	3.76	82.39	0.68
5700.00	0.17	256.86	5697.95	1.04	3.16	1.04	3.33	71.76	0.77
5800.00	0.17	255.06	5797.95	0.97	2.88	0.97	3.03	71.36	0.01
5900.00	0.09	238.71	5897.95	0.89	2.67	0.89	2.81	71.50	0.09
6000.00	0.29	78.36	5997.95	0.90	2.84	0.90	2.98	72.39	0.37
6100.00	0.26	59.91	6097.95	1.07	3.29	1.07	3.46	72.00	0.09
6200.00	0.23	153.56	6197.95	1.00	3.58	1.00	3.71	74.35	0.36
6300.00	0.22	21.16	6297.95	1.00	3.73	1.00	3.87	75.03	0.41
6400.00	0.30	162.14	6397.95	0.93	3.89	0.93	3.99	76.60	0.49
6500.00	0.10	241.07	6497.95	0.63	3.89	0.63	3.94	80.78	0.30
6600.00	0.35	105.31	6597.95	0.51	4.11	0.51	4.14	82.97	0.43
6700.00	1.03	121.75	6697.94	-0.05	5.18	-0.05	5.18	90.55	0.70
HORIZONTAL DISPLACEMENT IS 5.18 FEET AT 90.55 DEGREES									