

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy

Lease/Well: Patriot B/16-15

Location: S23 T6N R65W

Rig Name: Production

State/County: Colorado/Weld

Latitude: 40.47, Longitude: -104.51

GRID North is 0.61 Degrees East of True North

VS-Azi: 0.00 Degrees

GTI

GYRO TECHNOLOGIES, INC

FIELD COPY ONLY (NOT DEFINITIVE)

Elevation : 4690

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: patriotb16-15-01_ed.ut

Minimum Curvature Method

Report Date/Time: 12/29/2010 / 15:51

Vaughn Energy Services

Fort Worth, Texas

817-741-3610

Ray Seago

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	0.42	31.75	100.00	0.31	0.19	0.31	0.37	31.75	0.42
200.00	0.40	34.35	200.00	0.91	0.58	0.91	1.08	32.58	0.03
300.00	0.17	48.60	300.00	1.29	0.89	1.29	1.57	34.48	0.23
400.00	0.21	27.62	399.99	1.56	1.09	1.56	1.90	34.91	0.08
500.00	0.20	160.30	499.99	1.56	1.23	1.56	1.98	38.30	0.37
600.00	0.19	246.80	599.99	1.33	1.14	1.33	1.75	40.52	0.26
700.00	0.04	233.98	699.99	1.25	0.96	1.25	1.58	37.62	0.15
800.00	0.29	230.94	799.99	1.07	0.74	1.07	1.31	34.73	0.25
900.00	0.15	287.48	899.99	0.96	0.43	0.96	1.05	24.00	0.24
1000.00	0.08	296.47	999.99	1.03	0.24	1.03	1.05	13.11	0.07
1100.00	0.24	279.17	1099.99	1.09	-0.03	1.09	1.09	358.24	0.17
1200.00	0.16	292.07	1199.99	1.18	-0.37	1.18	1.23	342.45	0.10
1300.00	0.21	298.61	1299.99	1.32	-0.66	1.32	1.47	333.31	0.06
1400.00	0.34	237.77	1399.99	1.24	-1.08	1.24	1.65	319.10	0.30
1500.00	0.19	316.73	1499.99	1.20	-1.44	1.20	1.88	309.79	0.36
1600.00	0.22	295.78	1599.99	1.40	-1.73	1.40	2.22	309.12	0.08
1700.00	0.22	302.50	1699.99	1.59	-2.05	1.59	2.59	307.68	0.03
1800.00	0.29	189.06	1799.99	1.44	-2.25	1.44	2.67	302.55	0.42
1900.00	0.53	152.15	1899.98	0.78	-2.08	0.78	2.22	290.54	0.35
2000.00	1.15	140.46	1999.97	-0.41	-1.22	-0.41	1.29	251.55	0.64
2100.00	1.64	156.01	2099.94	-2.49	0.00	-2.49	2.49	179.96	0.61
2200.00	1.85	146.59	2199.90	-5.14	1.47	-5.14	5.35	164.03	0.35
2300.00	2.05	148.20	2299.84	-8.01	3.30	-8.01	8.66	157.59	0.21
2400.00	2.07	138.17	2399.78	-10.87	5.45	-10.87	12.16	153.39	0.36
2500.00	2.11	160.96	2499.71	-13.96	7.25	-13.96	15.73	152.55	0.83
2600.00	2.09	159.45	2599.64	-17.41	8.49	-17.41	19.37	153.99	0.06
2700.00	1.76	156.43	2699.59	-20.52	9.75	-20.52	22.72	154.59	0.35
2800.00	1.56	162.42	2799.55	-23.22	10.77	-23.22	25.60	155.12	0.26
2900.00	1.19	159.26	2899.52	-25.49	11.55	-25.49	27.98	155.63	0.38
3000.00	1.16	154.44	2999.50	-27.37	12.35	-27.37	30.03	155.71	0.10
3100.00	1.14	194.18	3099.48	-29.25	12.54	-29.25	31.83	156.79	0.78
3200.00	0.91	163.83	3199.46	-30.99	12.52	-30.99	33.42	158.00	0.58
3300.00	0.81	168.16	3299.45	-32.44	12.89	-32.44	34.90	158.33	0.12
3400.00	0.73	166.54	3399.44	-33.75	13.18	-33.75	36.23	158.67	0.09

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	0.81	174.81	3499.43	-35.07	13.39	-35.07	37.54	159.10	0.14
3600.00	0.78	172.80	3599.42	-36.45	13.54	-36.45	38.88	159.62	0.04
3700.00	0.94	166.91	3699.41	-37.92	13.81	-37.92	40.35	159.99	0.18
3800.00	1.04	178.23	3799.40	-39.62	14.02	-39.62	42.03	160.51	0.22
3900.00	1.24	196.12	3899.38	-41.57	13.75	-41.57	43.79	161.70	0.40
4000.00	1.30	200.09	3999.35	-43.67	13.06	-43.67	45.58	163.35	0.11
4100.00	1.24	192.51	4099.33	-45.79	12.44	-45.79	47.45	164.80	0.18
4200.00	1.27	191.06	4199.30	-47.92	12.00	-47.92	49.40	165.95	0.04
4300.00	1.33	197.97	4299.28	-50.11	11.43	-50.11	51.40	167.16	0.17
4400.00	1.09	198.01	4399.26	-52.12	10.77	-52.12	53.22	168.32	0.24
4500.00	0.93	194.90	4499.24	-53.82	10.27	-53.82	54.79	169.20	0.17
4600.00	1.00	193.41	4599.23	-55.46	9.86	-55.46	56.33	169.92	0.07
4700.00	0.82	214.26	4699.21	-56.90	9.25	-56.90	57.65	170.76	0.38
4800.00	0.94	226.05	4799.20	-58.06	8.26	-58.06	58.64	171.90	0.22
4900.00	1.31	246.57	4899.18	-59.08	6.63	-59.08	59.45	173.60	0.54
5000.00	1.10	259.21	4999.16	-59.71	4.64	-59.71	59.89	175.56	0.34
5100.00	0.76	262.33	5099.15	-59.98	3.04	-59.98	60.05	177.10	0.34
5200.00	0.14	274.55	5199.14	-60.06	2.27	-60.06	60.10	177.84	0.63
5300.00	0.15	232.74	5299.14	-60.13	2.05	-60.13	60.16	178.05	0.10
5400.00	0.03	324.98	5399.14	-60.18	1.93	-60.18	60.21	178.16	0.15
5500.00	0.31	342.13	5499.14	-59.91	1.83	-59.91	59.93	178.25	0.28
5600.00	0.30	26.99	5599.14	-59.41	1.87	-59.41	59.44	178.20	0.23
5700.00	0.25	337.81	5699.14	-58.97	1.91	-58.97	59.00	178.15	0.24
5800.00	0.25	6.88	5799.14	-58.55	1.85	-58.55	58.58	178.19	0.13
5900.00	0.56	168.92	5899.14	-58.81	1.97	-58.81	58.84	178.08	0.80
6000.00	1.20	174.52	5999.13	-60.33	2.16	-60.33	60.36	177.95	0.64
6100.00	1.70	175.88	6099.09	-62.85	2.37	-62.85	62.89	177.84	0.51
6200.00	1.83	176.53	6199.05	-65.93	2.57	-65.93	65.98	177.76	0.13
6300.00	1.73	169.94	6299.00	-69.01	2.93	-69.01	69.07	177.56	0.23
6400.00	1.65	159.04	6398.96	-71.83	3.71	-71.83	71.93	177.04	0.33
6500.00	1.77	145.31	6498.91	-74.45	5.11	-74.45	74.62	176.08	0.43
6600.00	1.86	139.78	6598.86	-76.95	7.03	-76.95	77.28	174.78	0.19
6700.00	2.01	130.91	6698.80	-79.34	9.40	-79.34	79.89	173.24	0.34
6800.00	2.26	131.49	6798.74	-81.80	12.21	-81.80	82.70	171.51	0.25
<div> <div>HORIZONTAL DISPLACEMENT IS</div> <div>82.70 FEET AT 171.51 DEGREES</div> </div>									