

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy

Lease/Well: Patriot/16-2

Location: S16 T5N R64W

Rig Name: Production

State/County: Colorado/Weld

Latitude: 40.40, Longitude: -140.55

GRID North is 0.61 Degrees East of True North

VS-Azi: 0.00 Degrees

GTI

GYRO TECHNOLOGIES, INC

FIELD COPY ONLY (NOT DEFINITIVE)

Elevation : 4572

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: patriotb16-2-01_ed.ut

Minimum Curvature Method

Report Date/Time: 1/6/2011 / 16:47

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	0.13	9.62	100.00	0.11	0.02	0.11	0.11	9.62	0.13
200.00	0.10	267.44	200.00	0.22	-0.05	0.22	0.22	346.51	0.18
300.00	0.44	302.69	300.00	0.42	-0.46	0.42	0.62	312.17	0.36
400.00	0.07	26.29	400.00	0.68	-0.75	0.68	1.01	312.06	0.43
500.00	0.33	302.48	500.00	0.89	-0.97	0.89	1.32	312.59	0.33
600.00	0.05	188.46	600.00	1.00	-1.22	1.00	1.58	309.42	0.36
700.00	0.26	250.67	700.00	0.89	-1.44	0.89	1.69	301.57	0.24
800.00	0.37	272.95	799.99	0.83	-1.97	0.83	2.14	292.72	0.16
900.00	0.36	286.24	899.99	0.93	-2.60	0.93	2.76	289.73	0.08
1000.00	0.15	69.55	999.99	1.07	-2.78	1.07	2.97	290.99	0.49
1100.00	0.13	196.74	1099.99	1.01	-2.69	1.01	2.87	290.54	0.25
1200.00	0.25	84.92	1199.99	0.92	-2.50	0.92	2.67	290.20	0.31
1300.00	0.35	48.61	1299.99	1.14	-2.06	1.14	2.36	298.92	0.21
1400.00	0.30	66.46	1399.99	1.44	-1.60	1.44	2.15	312.06	0.11
1500.00	0.28	73.74	1499.99	1.61	-1.13	1.61	1.97	324.97	0.04
1600.00	0.21	78.73	1599.99	1.72	-0.72	1.72	1.86	337.17	0.07
1700.00	0.40	76.30	1699.99	1.84	-0.20	1.84	1.85	353.65	0.20
1800.00	0.56	81.01	1799.98	1.99	0.62	1.99	2.09	17.25	0.16
1900.00	0.66	78.43	1899.98	2.19	1.67	2.19	2.75	37.32	0.10
2000.00	0.55	72.30	1999.97	2.45	2.68	2.45	3.63	47.66	0.13
2100.00	0.61	64.09	2099.97	2.82	3.62	2.82	4.59	52.02	0.10
2200.00	0.77	62.50	2199.96	3.36	4.69	3.36	5.77	54.33	0.16
2300.00	0.83	53.86	2299.95	4.10	5.87	4.10	7.16	55.04	0.14
2400.00	0.68	52.72	2399.94	4.89	6.93	4.89	8.48	54.78	0.15
2500.00	1.22	51.59	2499.93	5.92	8.24	5.92	10.15	54.32	0.54
2600.00	1.39	57.16	2599.90	7.24	10.09	7.24	12.42	54.36	0.21
2700.00	1.38	54.75	2699.87	8.59	12.09	8.59	14.83	54.62	0.06
2800.00	1.47	60.51	2799.84	9.91	14.19	9.91	17.31	55.07	0.17
2900.00	1.24	84.70	2899.81	10.64	16.38	10.64	19.54	56.99	0.61
3000.00	0.73	55.70	2999.80	11.10	17.98	11.10	21.13	58.32	0.70
3100.00	0.57	41.77	3099.79	11.83	18.84	11.83	22.25	57.87	0.22
3200.00	0.37	18.14	3199.79	12.51	19.28	12.51	22.98	57.02	0.28
3300.00	0.18	33.21	3299.79	12.94	19.46	12.94	23.37	56.37	0.20
3400.00	0.38	163.71	3399.79	12.75	19.64	12.75	23.42	57.00	0.51

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	0.50	152.39	3499.78	12.05	19.93	12.05	23.29	58.86	0.15
3600.00	0.76	193.63	3599.78	11.02	19.98	11.02	22.82	61.13	0.50
3700.00	0.78	201.23	3699.77	9.74	19.58	9.74	21.87	63.54	0.10
3800.00	0.78	200.29	3799.76	8.47	19.10	8.47	20.89	66.07	0.01
3900.00	0.61	182.71	3899.75	7.31	18.84	7.31	20.21	68.79	0.27
4000.00	0.67	187.48	3999.75	6.20	18.74	6.20	19.74	71.69	0.09
4100.00	0.55	137.33	4099.74	5.27	18.98	5.27	19.70	74.49	0.53
4200.00	0.69	176.17	4199.74	4.32	19.35	4.32	19.82	77.43	0.43
4300.00	0.60	176.90	4299.73	3.19	19.41	3.19	19.67	80.66	0.10
4400.00	0.57	159.93	4399.72	2.21	19.61	2.21	19.74	83.58	0.17
4500.00	0.71	142.27	4499.72	1.25	20.16	1.25	20.20	86.45	0.24
4600.00	0.84	145.06	4599.71	0.16	20.96	0.16	20.96	89.57	0.14
4700.00	0.42	146.62	4699.70	-0.75	21.59	-0.75	21.60	92.00	0.42
4800.00	0.50	107.74	4799.70	-1.20	22.20	-1.20	22.24	93.08	0.31
4900.00	0.37	152.59	4899.70	-1.62	22.77	-1.62	22.82	94.06	0.35
5000.00	0.58	166.29	4999.69	-2.40	23.04	-2.40	23.16	95.95	0.23
5100.00	0.46	107.55	5099.69	-3.01	23.54	-3.01	23.74	97.29	0.52
5200.00	0.63	108.32	5199.69	-3.31	24.45	-3.31	24.68	97.71	0.17
5300.00	0.72	110.67	5299.68	-3.70	25.56	-3.70	25.83	98.24	0.09
5400.00	0.78	130.37	5399.67	-4.37	26.67	-4.37	27.02	99.30	0.26
5500.00	1.13	139.29	5499.66	-5.55	27.83	-5.55	28.38	101.28	0.38
5600.00	1.42	142.26	5599.63	-7.27	29.23	-7.27	30.12	103.98	0.30
5700.00	1.86	152.74	5699.59	-9.70	30.73	-9.70	32.22	107.51	0.53
5800.00	2.02	161.33	5799.53	-12.81	32.04	-12.81	34.50	111.80	0.33
5900.00	1.41	164.77	5899.49	-15.68	32.93	-15.68	36.47	115.46	0.62
6000.00	1.72	166.43	5999.45	-18.32	33.60	-18.32	38.27	118.60	0.31
6100.00	1.44	161.45	6099.41	-20.97	34.35	-20.97	40.25	121.40	0.31
6200.00	2.03	166.26	6199.37	-23.88	35.17	-23.88	42.52	124.18	0.60
6300.00	1.59	155.12	6299.32	-26.86	36.18	-26.86	45.06	126.59	0.56
6400.00	1.58	143.63	6399.28	-29.23	37.58	-29.23	47.61	127.88	0.32
6500.00	1.42	149.77	6499.24	-31.42	39.03	-31.42	50.10	128.83	0.23
6600.00	1.40	140.49	6599.21	-33.42	40.42	-33.42	52.45	129.59	0.23
6700.00	1.53	144.70	6699.18	-35.46	41.97	-35.46	54.95	130.19	0.17
6800.00	1.26	132.37	6799.15	-37.30	43.56	-37.30	57.35	130.57	0.40
HORIZONTAL DISPLACEMENT IS 57.35 FEET AT 130.57 DEGREES									