

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy
 Lease/Well: Patriot / B16-5
 Location: S-16 T-5N R-64W

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

Latitude: 40.40, Longitude: -104.56
 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: 2/11/2011 / 18:17

Vaughn Energy Services
 Fort Worth, Texas
 817-741-3610
 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	0.33	63.17	100.00	0.13	0.25	0.13	0.28	63.17	0.33
200.00	0.08	163.84	200.00	0.19	0.52	0.19	0.56	69.92	0.35
300.00	0.14	16.44	300.00	0.25	0.58	0.25	0.63	66.80	0.21
400.00	0.10	104.35	400.00	0.35	0.70	0.35	0.78	63.68	0.17
500.00	0.18	239.00	500.00	0.25	0.65	0.25	0.70	69.48	0.26
600.00	0.10	326.41	600.00	0.24	0.47	0.24	0.53	63.15	0.20
700.00	0.01	177.55	700.00	0.30	0.42	0.30	0.52	54.54	0.11
800.00	0.13	241.41	800.00	0.24	0.33	0.24	0.41	54.02	0.12
900.00	0.09	14.01	900.00	0.26	0.25	0.26	0.36	43.80	0.20
1000.00	0.22	236.77	1000.00	0.23	0.11	0.23	0.26	25.47	0.29
1100.00	0.16	268.76	1100.00	0.13	-0.19	0.13	0.23	303.44	0.12
1200.00	0.08	16.46	1200.00	0.19	-0.31	0.19	0.37	301.73	0.21
1300.00	0.04	123.48	1300.00	0.24	-0.26	0.24	0.36	312.99	0.10
1400.00	0.10	351.62	1400.00	0.31	-0.25	0.31	0.39	321.47	0.13
1500.00	0.15	270.53	1500.00	0.39	-0.38	0.39	0.55	315.51	0.16
1600.00	0.31	246.01	1600.00	0.28	-0.76	0.28	0.81	290.32	0.19
1700.00	0.45	256.18	1699.99	0.08	-1.39	0.08	1.39	273.22	0.15
1800.00	0.42	233.30	1799.99	-0.23	-2.06	-0.23	2.07	263.57	0.17
1900.00	0.34	216.72	1899.99	-0.69	-2.53	-0.69	2.62	254.78	0.13
2000.00	0.28	193.88	1999.99	-1.16	-2.76	-1.16	3.00	247.24	0.14
2100.00	0.59	174.72	2099.98	-1.90	-2.77	-1.90	3.36	235.54	0.34
2200.00	0.72	163.94	2199.98	-3.02	-2.55	-3.02	3.95	220.25	0.18
2300.00	0.76	166.00	2299.97	-4.26	-2.22	-4.26	4.81	207.49	0.05
2400.00	0.97	157.01	2399.96	-5.69	-1.73	-5.69	5.94	196.88	0.25
2500.00	0.85	153.29	2499.95	-7.13	-1.06	-7.13	7.21	188.48	0.14
2600.00	1.00	152.55	2599.93	-8.56	-0.33	-8.56	8.57	182.20	0.15
2700.00	0.94	136.39	2699.92	-9.93	0.64	-9.93	9.95	176.32	0.28
2800.00	1.04	131.13	2799.90	-11.12	1.89	-11.12	11.28	170.37	0.13
2900.00	1.16	93.14	2899.89	-11.77	3.58	-11.77	12.30	163.10	0.72
3000.00	1.22	110.20	2999.87	-12.19	5.58	-12.19	13.41	155.40	0.36
3100.00	1.29	125.61	3099.84	-13.22	7.50	-13.22	15.19	150.44	0.35
3200.00	1.37	149.89	3199.82	-14.91	9.02	-14.91	17.42	148.84	0.57
3300.00	1.29	190.02	3299.79	-17.06	9.42	-17.06	19.49	151.09	0.92
3400.00	1.39	170.08	3399.76	-19.36	9.43	-19.36	21.54	154.03	0.47

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	1.58	172.83	3499.73	-21.92	9.81	-21.92	24.02	155.89	0.21
3600.00	1.53	171.46	3599.69	-24.61	10.18	-24.61	26.64	157.53	0.06
3700.00	1.51	189.31	3699.66	-27.23	10.17	-27.23	29.07	159.53	0.47
3800.00	1.36	193.70	3799.63	-29.68	9.67	-29.68	31.22	161.95	0.18
3900.00	1.28	188.17	3899.60	-31.94	9.23	-31.94	33.25	163.88	0.15
4000.00	1.49	195.93	3999.57	-34.30	8.72	-34.30	35.39	165.74	0.28
4100.00	1.30	198.48	4099.54	-36.62	8.00	-36.62	37.49	167.67	0.19
4200.00	1.26	190.66	4199.52	-38.78	7.44	-38.78	39.48	169.14	0.18
4300.00	1.31	193.24	4299.49	-40.97	6.97	-40.97	41.56	170.34	0.08
4400.00	0.95	238.40	4399.47	-42.52	6.00	-42.52	42.94	171.96	0.93
4500.00	0.30	308.02	4499.47	-42.79	5.09	-42.79	43.10	173.22	0.90
4600.00	0.40	14.77	4599.47	-42.30	4.98	-42.30	42.59	173.29	0.39
4700.00	0.53	95.98	4699.46	-42.00	5.52	-42.00	42.36	172.51	0.61
4800.00	0.37	129.10	4799.46	-42.26	6.23	-42.26	42.71	171.61	0.30
4900.00	0.44	93.92	4899.46	-42.49	6.87	-42.49	43.04	170.82	0.26
5000.00	0.55	144.72	4999.46	-42.91	7.53	-42.91	43.57	170.04	0.44
5100.00	0.54	155.80	5099.45	-43.74	8.01	-43.74	44.46	169.62	0.11
5200.00	0.73	153.66	5199.45	-44.74	8.48	-44.74	45.53	169.26	0.18
5300.00	1.24	166.94	5299.43	-46.36	9.01	-46.36	47.22	169.00	0.56
5400.00	1.62	199.55	5399.40	-48.74	8.78	-48.74	49.52	169.79	0.88
5500.00	1.67	176.30	5499.36	-51.52	8.40	-51.52	52.20	170.74	0.66
5600.00	1.82	174.35	5599.31	-54.55	8.65	-54.55	55.23	170.99	0.16
5700.00	1.93	152.40	5699.26	-57.62	9.59	-57.62	58.41	170.55	0.72
5800.00	1.75	160.20	5799.21	-60.55	10.89	-60.55	61.52	169.81	0.31
5900.00	1.11	140.37	5899.18	-62.73	12.02	-62.73	63.88	169.15	0.81
6000.00	1.53	160.23	5999.15	-64.73	13.09	-64.73	66.04	168.57	0.62
6100.00	1.77	159.16	6099.11	-67.43	14.09	-67.43	68.88	168.20	0.24
6200.00	1.81	157.20	6199.06	-70.32	15.25	-70.32	71.96	167.77	0.07
6300.00	1.92	148.55	6299.01	-73.20	16.73	-73.20	75.09	167.13	0.30
6400.00	2.01	149.21	6398.95	-76.14	18.50	-76.14	78.35	166.34	0.09
6500.00	2.07	154.86	6498.89	-79.28	20.17	-79.28	81.80	165.73	0.21
6600.00	2.42	154.20	6598.81	-82.81	21.85	-82.81	85.65	165.22	0.35
6700.00	3.16	150.10	6698.69	-87.10	24.14	-87.10	90.39	164.51	0.76
6800.00	3.74	139.88	6798.51	-91.98	27.62	-91.98	96.04	163.29	0.84
6806.00	3.74	139.53	6804.50	-92.28	27.87	-92.28	96.40	163.19	0.42

HORIZONTAL DISPLACEMENT IS 96.40 FEET AT 163.19 DEGREES									
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