

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy
 Lease/Well: National Hog Farm / 24-9
 Location: S-9 T-5N R-63W

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

Latitude: 40.41, Longitude: -104.44
 GRID North is 0.68 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: 6/13/2011 / 20:33

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	0.42	331.39	100.00	0.32	-0.18	0.32	0.37	331.39	0.42
200.00	0.46	346.68	200.00	1.04	-0.45	1.04	1.13	336.74	0.12
300.00	0.22	29.75	299.99	1.59	-0.44	1.59	1.65	344.46	0.33
400.00	0.32	42.75	399.99	1.96	-0.16	1.96	1.97	355.33	0.11
500.00	0.46	61.30	499.99	2.36	0.38	2.36	2.39	9.17	0.19
600.00	0.27	84.03	599.99	2.58	0.97	2.58	2.75	20.60	0.24
700.00	0.34	92.16	699.99	2.59	1.50	2.59	2.99	30.00	0.08
800.00	0.46	96.67	799.99	2.53	2.19	2.53	3.35	40.80	0.13
900.00	0.23	93.83	899.98	2.47	2.78	2.47	3.72	48.40	0.23
1000.00	0.48	109.35	999.98	2.32	3.38	2.32	4.10	55.52	0.26
1100.00	0.75	80.94	1099.98	2.29	4.42	2.29	4.98	62.67	0.40
1200.00	0.83	95.83	1199.97	2.32	5.79	2.32	6.24	68.21	0.22
1300.00	0.82	86.43	1299.96	2.29	7.23	2.29	7.58	72.45	0.14
1400.00	0.97	84.17	1399.94	2.42	8.79	2.42	9.12	74.62	0.16
1500.00	0.88	91.26	1499.93	2.49	10.40	2.49	10.69	76.55	0.15
1600.00	1.06	90.54	1599.92	2.46	12.09	2.46	12.34	78.49	0.18
1700.00	1.09	100.56	1699.90	2.28	13.94	2.28	14.13	80.72	0.19
1800.00	1.07	103.24	1799.88	1.89	15.78	1.89	15.90	83.17	0.05
1900.00	0.95	86.69	1899.87	1.73	17.51	1.73	17.60	84.37	0.31
2000.00	0.86	68.17	1999.85	2.05	19.03	2.05	19.14	83.85	0.30
2100.00	1.02	50.39	2099.84	2.90	20.42	2.90	20.62	81.92	0.33
2200.00	0.69	31.28	2199.83	3.98	21.41	3.98	21.78	79.47	0.44
2300.00	0.28	334.87	2299.83	4.71	21.62	4.71	22.13	77.70	0.58
2400.00	0.82	290.99	2399.82	5.19	20.85	5.19	21.48	76.01	0.65
2500.00	0.81	293.00	2499.81	5.73	19.53	5.73	20.35	73.66	0.03
2600.00	0.77	289.86	2599.80	6.23	18.25	6.23	19.28	71.15	0.05
2700.00	0.81	323.46	2699.79	7.03	17.19	7.03	18.57	67.77	0.46
2800.00	1.03	319.00	2799.78	8.27	16.18	8.27	18.17	62.92	0.23
2900.00	1.00	324.87	2899.76	9.66	15.09	9.66	17.92	57.37	0.11
3000.00	0.88	308.76	2999.75	10.85	13.99	10.85	17.71	52.20	0.29
3100.00	1.13	303.11	3099.74	11.88	12.57	11.88	17.29	46.62	0.27
3200.00	1.72	303.69	3199.70	13.25	10.48	13.25	16.90	38.35	0.59
3300.00	2.44	305.83	3299.64	15.33	7.50	15.33	17.07	26.08	0.72
3400.00	2.58	307.07	3399.54	17.93	3.98	17.93	18.37	12.52	0.14

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	2.55	309.02	3499.44	20.69	0.46	20.69	20.69	1.28	0.09
3600.00	2.63	308.04	3599.34	23.50	-3.07	23.50	23.70	352.55	0.09
3700.00	2.64	310.68	3699.23	26.42	-6.63	26.42	27.24	345.92	0.12
3800.00	2.68	311.80	3799.13	29.48	-10.12	29.48	31.17	341.06	0.06
3900.00	2.72	312.05	3899.01	32.62	-13.62	32.62	35.35	337.34	0.05
4000.00	2.74	313.03	3998.90	35.85	-17.13	35.85	39.73	334.46	0.05
4100.00	2.76	310.90	4098.79	39.06	-20.70	39.06	44.21	332.08	0.10
4200.00	2.54	311.51	4198.68	42.10	-24.18	42.10	48.55	330.13	0.22
4300.00	2.66	316.94	4298.58	45.26	-27.42	45.26	52.92	328.79	0.27
4400.00	2.79	305.37	4398.46	48.36	-30.98	48.36	57.43	327.35	0.56
4500.00	3.05	301.94	4498.33	51.18	-35.22	51.18	62.13	325.46	0.32
4600.00	3.14	304.87	4598.19	54.15	-39.73	54.15	67.17	323.73	0.18
4700.00	3.34	300.13	4698.03	57.18	-44.51	57.18	72.46	322.11	0.33
4800.00	2.47	295.54	4797.90	59.58	-48.97	59.58	77.12	320.58	0.90
4900.00	2.06	290.37	4897.82	61.13	-52.60	61.13	80.65	319.29	0.45
5000.00	1.33	282.37	4997.78	62.01	-55.43	62.01	83.17	318.21	0.77
5100.00	1.15	243.33	5097.75	61.81	-57.46	61.81	84.39	317.09	0.85
5200.00	0.94	195.69	5197.74	60.57	-58.58	60.57	84.26	315.96	0.87
5300.00	1.10	180.38	5297.72	58.82	-58.80	58.82	83.17	315.01	0.31
5400.00	1.07	183.52	5397.71	56.93	-58.87	56.93	81.89	314.04	0.07
5500.00	0.86	189.37	5497.69	55.26	-59.05	55.26	80.87	313.10	0.24
5600.00	0.69	198.72	5597.68	53.95	-59.36	53.95	80.21	312.26	0.21
5700.00	0.50	213.56	5697.68	53.02	-59.80	53.02	79.91	311.56	0.24
5800.00	0.07	347.41	5797.68	52.71	-60.05	52.71	79.91	311.28	0.55
5900.00	0.22	69.24	5897.68	52.84	-59.88	52.84	79.86	311.43	0.23
6000.00	0.35	49.34	5997.67	53.11	-59.47	53.11	79.73	311.77	0.16
6100.00	0.55	31.19	6097.67	53.72	-58.99	53.72	79.78	312.32	0.24
6200.00	0.72	352.77	6197.67	54.75	-58.82	54.75	80.36	312.95	0.45
6300.00	0.88	355.38	6297.66	56.13	-58.96	56.13	81.41	313.59	0.17
6400.00	1.04	321.07	6397.64	57.60	-59.59	57.60	82.88	314.03	0.58
6500.00	1.63	338.12	6497.62	59.62	-60.69	59.62	85.08	314.49	0.71
6600.00	2.10	324.27	6597.56	62.43	-62.29	62.43	88.19	315.07	0.65
6700.00	2.76	328.28	6697.47	65.97	-64.63	65.97	92.35	315.59	0.68
HORIZONTAL DISPLACEMENT IS 92.35 FEET AT 315.59 DEGREES									