

**VES**

VAUGHN ENERGY SERVICES

Company: Noble Energy  
 Lease/Well: National Hog Farm / 14-9  
 Location: S-9 T-5N R-63W

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

Latitude: 40.41, Longitude: -104.45  
 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 / 19:55

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	0.83	186.67	100.00	-0.72	-0.08	-0.72	0.72	186.67	0.83
200.00	2.09	198.60	199.96	-3.16	-0.75	-3.16	3.25	193.33	1.29
300.00	5.20	206.97	299.75	-8.92	-3.38	-8.92	9.54	200.77	3.15
400.00	6.05	217.15	399.27	-17.16	-8.62	-17.16	19.21	206.68	1.31
500.00	5.87	217.03	498.73	-25.44	-14.88	-25.44	29.48	210.33	0.19
600.00	5.45	219.60	598.24	-33.18	-20.99	-33.18	39.27	212.32	0.48
700.00	5.31	218.84	697.80	-40.45	-26.92	-40.45	48.59	213.65	0.16
800.00	5.06	222.05	797.39	-47.33	-32.78	-47.33	57.57	214.71	0.38
900.00	4.99	221.37	897.01	-53.87	-38.61	-53.87	66.28	215.63	0.09
1000.00	4.73	219.00	996.65	-60.34	-44.08	-60.34	74.73	216.15	0.33
1100.00	4.81	220.18	1096.30	-66.74	-49.38	-66.74	83.02	216.49	0.12
1200.00	4.57	215.55	1195.97	-73.18	-54.40	-73.18	91.19	216.62	0.45
1300.00	4.41	217.37	1295.66	-79.48	-59.04	-79.48	99.01	216.61	0.21
1400.00	4.15	216.49	1395.38	-85.44	-63.53	-85.44	106.47	216.63	0.27
1500.00	3.81	217.36	1495.14	-90.99	-67.69	-90.99	113.41	216.65	0.35
1600.00	3.28	217.42	1594.95	-95.90	-71.45	-95.90	119.59	216.69	0.52
1700.00	3.00	217.29	1694.80	-100.26	-74.77	-100.26	125.07	216.72	0.28
1800.00	2.68	218.36	1794.67	-104.17	-77.81	-104.17	130.02	216.76	0.33
1900.00	2.34	223.04	1894.58	-107.50	-80.65	-107.50	134.39	216.88	0.39
2000.00	1.98	236.29	1994.51	-109.95	-83.49	-109.95	138.06	217.21	0.62
2100.00	1.86	227.26	2094.45	-112.01	-86.12	-112.01	141.29	217.55	0.33
2200.00	1.67	230.65	2194.40	-114.04	-88.43	-114.04	144.31	217.79	0.21
2300.00	1.40	228.09	2294.37	-115.77	-90.47	-115.77	146.93	218.01	0.28
2400.00	0.99	227.97	2394.35	-117.17	-92.02	-117.17	148.99	218.14	0.41
2500.00	0.97	230.43	2494.33	-118.29	-93.32	-118.29	150.67	218.27	0.05
2600.00	0.85	236.89	2594.32	-119.24	-94.60	-119.24	152.20	218.43	0.16
2700.00	0.83	238.01	2694.31	-120.02	-95.83	-120.02	153.59	218.60	0.03
2800.00	0.78	237.27	2794.30	-120.77	-97.01	-120.77	154.91	218.77	0.05
2900.00	0.75	246.56	2894.29	-121.40	-98.18	-121.40	156.14	218.96	0.13
3000.00	0.69	245.47	2994.28	-121.91	-99.33	-121.91	157.26	219.17	0.05
3100.00	0.61	258.17	3094.28	-122.27	-100.41	-122.27	158.22	219.39	0.17
3200.00	0.19	346.47	3194.27	-122.23	-100.96	-122.23	158.53	219.56	0.63
3300.00	1.08	22.22	3294.27	-121.20	-100.65	-121.20	157.54	219.71	0.93
3400.00	1.99	31.59	3394.23	-118.85	-99.38	-118.85	154.93	219.90	0.94

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	2.54	24.57	3494.15	-115.36	-97.55	-115.36	151.07	220.22	0.62
3600.00	2.78	27.81	3594.04	-111.19	-95.50	-111.19	146.57	220.66	0.29
3700.00	2.55	21.16	3693.94	-106.97	-93.56	-106.97	142.11	221.17	0.39
3800.00	2.25	30.15	3793.85	-103.20	-91.77	-103.20	138.11	221.65	0.48
3900.00	2.16	20.71	3893.77	-99.75	-90.13	-99.75	134.44	222.10	0.37
4000.00	1.92	17.03	3993.71	-96.39	-88.97	-96.39	131.18	222.71	0.27
4100.00	1.55	9.96	4093.67	-93.46	-88.25	-93.46	128.54	223.36	0.42
4200.00	1.36	354.76	4193.63	-90.95	-88.12	-90.95	126.64	224.10	0.43
4300.00	1.13	343.72	4293.61	-88.83	-88.50	-88.83	125.39	224.90	0.33
4400.00	0.87	331.63	4393.60	-87.22	-89.14	-87.22	124.71	225.62	0.33
4500.00	0.72	332.09	4493.59	-86.00	-89.79	-86.00	124.33	226.24	0.14
4600.00	0.58	335.93	4593.58	-84.97	-90.30	-84.97	123.99	226.74	0.15
4700.00	0.32	338.28	4693.58	-84.25	-90.61	-84.25	123.72	227.08	0.26
4800.00	0.37	358.26	4793.57	-83.67	-90.72	-83.67	123.41	227.32	0.13
4900.00	0.21	355.15	4893.57	-83.16	-90.75	-83.16	123.09	227.50	0.16
5000.00	0.26	309.25	4993.57	-82.83	-90.94	-82.83	123.01	227.67	0.19
5100.00	0.28	306.63	5093.57	-82.54	-91.31	-82.54	123.09	227.89	0.02
5200.00	0.18	357.99	5193.57	-82.23	-91.51	-82.23	123.03	228.06	0.22
5300.00	0.33	257.44	5293.57	-82.13	-91.80	-82.13	123.18	228.18	0.40
5400.00	0.84	220.07	5393.56	-82.76	-92.55	-82.76	124.16	228.20	0.62
5500.00	1.02	192.35	5493.55	-84.19	-93.22	-84.19	125.61	227.91	0.48
5600.00	1.30	179.11	5593.53	-86.19	-93.39	-86.19	127.09	227.29	0.38
5700.00	1.07	165.81	5693.51	-88.23	-93.14	-88.23	128.30	226.55	0.35
5800.00	0.86	193.60	5793.50	-89.87	-93.09	-89.87	129.39	226.01	0.51
5900.00	1.06	159.78	5893.48	-91.46	-92.95	-91.46	130.40	225.46	0.59
6000.00	0.77	162.19	5993.47	-92.97	-92.43	-92.97	131.09	224.83	0.29
6100.00	1.31	164.81	6093.45	-94.70	-91.92	-94.70	131.98	224.15	0.54
6200.00	1.40	155.67	6193.43	-96.92	-91.12	-96.92	133.02	223.23	0.24
6300.00	1.90	154.90	6293.38	-99.54	-89.91	-99.54	134.13	222.09	0.50
6400.00	2.77	152.05	6393.30	-103.18	-88.07	-103.18	135.66	220.48	0.87
6500.00	3.16	144.71	6493.17	-107.56	-85.35	-107.56	137.31	218.43	0.54
6600.00	2.34	148.80	6593.05	-111.56	-82.70	-111.56	138.87	216.55	0.84
6700.00	1.80	149.23	6692.98	-114.65	-80.84	-114.65	140.29	215.19	0.54
HORIZONTAL DISPLACEMENT IS 140.29 FEET AT 215.19 DEGREES									