

**VES**

VAUGHN ENERGY SERVICES

Company: Noble Energy

Lease/Well: Hettinger D / 30-8

Location: S-30 T-3N R-64W

Rig Name: Production

State/County: Colorado / Weld County

Latitude: 40.20, Longitude: -104.59

GRID North is 0.59 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: 3/28/2011 / 20:17

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	0.16	49.21	100.00	0.09	0.11	0.09	0.14	49.21	0.16
200.00	0.12	84.81	200.00	0.19	0.31	0.19	0.37	58.49	0.09
300.00	0.10	72.90	300.00	0.23	0.50	0.23	0.55	65.54	0.03
400.00	0.13	60.03	400.00	0.31	0.68	0.31	0.75	65.59	0.04
500.00	0.13	53.38	500.00	0.43	0.87	0.43	0.97	63.57	0.01
600.00	0.13	48.95	600.00	0.57	1.04	0.57	1.19	61.25	0.01
700.00	0.10	334.65	700.00	0.73	1.09	0.73	1.31	56.30	0.14
800.00	0.10	294.79	800.00	0.84	0.97	0.84	1.29	49.05	0.07
900.00	0.04	164.27	900.00	0.85	0.90	0.85	1.24	46.84	0.13
1000.00	0.12	246.84	1000.00	0.77	0.82	0.77	1.12	46.67	0.12
1100.00	0.22	224.62	1100.00	0.60	0.59	0.60	0.84	44.75	0.12
1200.00	0.25	225.93	1200.00	0.31	0.30	0.31	0.43	44.22	0.03
1300.00	0.27	241.40	1300.00	0.05	-0.06	0.05	0.08	306.36	0.07
1400.00	0.27	247.08	1399.99	-0.16	-0.49	-0.16	0.51	251.88	0.03
1500.00	0.34	269.46	1499.99	-0.25	-1.00	-0.25	1.03	255.74	0.14
1600.00	0.42	270.46	1599.99	-0.25	-1.67	-0.25	1.68	261.32	0.08
1700.00	0.52	274.74	1699.99	-0.21	-2.49	-0.21	2.50	265.10	0.11
1800.00	0.64	270.47	1799.98	-0.17	-3.51	-0.17	3.51	267.20	0.13
1900.00	0.67	281.16	1899.98	-0.05	-4.64	-0.05	4.64	269.33	0.12
2000.00	0.64	283.09	1999.97	0.18	-5.75	0.18	5.75	271.84	0.04
2100.00	0.40	235.66	2099.97	0.11	-6.58	0.11	6.58	270.99	0.47
2200.00	0.33	197.33	2199.96	-0.36	-6.95	-0.36	6.96	267.04	0.25
2300.00	0.50	171.45	2299.96	-1.07	-6.97	-1.07	7.06	261.28	0.25
2400.00	0.62	165.93	2399.96	-2.03	-6.78	-2.03	7.07	253.33	0.13
2500.00	0.78	159.54	2499.95	-3.19	-6.41	-3.19	7.16	243.52	0.18
2600.00	0.86	179.27	2599.94	-4.58	-6.16	-4.58	7.67	233.39	0.29
2700.00	1.02	194.61	2699.93	-6.19	-6.38	-6.19	8.89	225.86	0.30
2800.00	1.00	190.42	2799.91	-7.91	-6.76	-7.91	10.40	220.52	0.08
2900.00	0.77	195.09	2899.90	-9.41	-7.09	-9.41	11.78	217.00	0.24
3000.00	0.65	200.19	2999.89	-10.59	-7.46	-10.59	12.96	215.16	0.14
3100.00	0.54	207.85	3099.89	-11.54	-7.88	-11.54	13.97	214.32	0.13
3200.00	0.38	199.86	3199.88	-12.27	-8.21	-12.27	14.76	213.79	0.17
3300.00	0.41	187.44	3299.88	-12.94	-8.37	-12.94	15.41	212.90	0.09
3400.00	0.39	162.53	3399.88	-13.62	-8.31	-13.62	15.96	211.39	0.18

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	0.28	122.11	3499.88	-14.08	-8.00	-14.08	16.20	209.62	0.26
3600.00	0.51	63.45	3599.87	-14.01	-7.40	-14.01	15.84	207.84	0.44
3700.00	0.59	59.48	3699.87	-13.54	-6.55	-13.54	15.05	205.81	0.09
3800.00	0.62	43.80	3799.86	-12.89	-5.73	-12.89	14.11	203.97	0.17
3900.00	0.72	49.20	3899.86	-12.09	-4.88	-12.09	13.04	201.98	0.12
4000.00	0.89	44.29	3999.85	-11.12	-3.86	-11.12	11.77	199.14	0.19
4100.00	1.31	48.84	4099.83	-9.81	-2.45	-9.81	10.11	194.05	0.42
4200.00	1.58	47.04	4199.80	-8.12	-0.58	-8.12	8.14	184.12	0.28
4300.00	1.53	56.33	4299.76	-6.43	1.54	-6.43	6.61	166.53	0.26
4400.00	1.71	53.09	4399.72	-4.80	3.85	-4.80	6.15	141.27	0.20
4500.00	1.69	52.93	4499.68	-3.01	6.21	-3.01	6.90	115.89	0.02
4600.00	2.09	59.90	4599.62	-1.21	8.96	-1.21	9.04	97.71	0.46
4700.00	2.37	58.13	4699.54	0.79	12.30	0.79	12.32	86.30	0.29
4800.00	2.80	68.14	4799.44	2.80	16.32	2.80	16.56	80.28	0.62
4900.00	2.75	71.42	4899.33	4.47	20.86	4.47	21.33	77.91	0.16
5000.00	2.75	76.09	4999.21	5.81	25.46	5.81	26.11	77.15	0.22
5100.00	2.47	87.23	5099.11	6.49	29.94	6.49	30.63	77.77	0.58
5200.00	2.07	95.65	5199.03	6.42	33.89	6.42	34.49	79.28	0.52
5300.00	1.92	101.37	5298.97	5.91	37.32	5.91	37.79	81.01	0.25
5400.00	2.12	125.59	5398.91	4.50	40.47	4.50	40.72	83.65	0.87
5500.00	2.36	140.09	5498.83	1.85	43.29	1.85	43.33	87.56	0.61
5600.00	1.53	141.29	5598.78	-0.77	45.45	-0.77	45.45	90.97	0.82
5700.00	0.84	176.09	5698.75	-2.55	46.33	-2.55	46.40	93.15	0.97
5800.00	0.31	78.45	5798.75	-3.22	46.65	-3.22	46.76	93.95	0.93
5900.00	0.92	357.57	5898.75	-2.36	46.89	-2.36	46.95	92.88	0.93
6000.00	0.18	9.52	5998.74	-1.40	46.88	-1.40	46.90	91.71	0.75
6100.00	1.06	359.91	6098.73	-0.33	46.90	-0.33	46.90	90.40	0.88
6200.00	1.27	341.06	6198.71	1.64	46.54	1.64	46.57	87.98	0.43
6300.00	0.87	358.41	6298.70	3.45	46.16	3.45	46.29	85.72	0.51
6400.00	0.65	1.49	6398.69	4.78	46.16	4.78	46.40	84.09	0.23
6500.00	0.61	324.51	6498.68	5.78	45.86	5.78	46.22	82.81	0.40
6600.00	0.62	267.01	6598.68	6.19	45.01	6.19	45.43	82.17	0.59
6700.00	0.09	260.99	6698.67	6.15	44.39	6.15	44.82	82.11	0.52
6800.00	0.34	267.06	6798.67	6.12	44.01	6.12	44.44	82.08	0.25
6900.00	0.23	262.10	6898.67	6.08	43.52	6.08	43.94	82.05	0.12
7000.00	0.39	170.14	6998.67	5.72	43.38	5.72	43.76	82.49	0.46
<div> <div>HORIZONTAL DISPLACEMENT IS</div> <div>43.76 FEET AT 82.49 DEGREES</div> </div>									