

**VES**

VAUGHN ENERGY SERVICES

Company: NOBLE ENERGY  
 Lease/Well: NATIONAL HOG FARM/ #21-21  
 Location:  
 Rig Name: PRODUCTION  
 State/County: COLORADO/WELD COUNTY  
 Latitude: 40.38  
 GRID North is 0.69 Degrees East of True North  
 VS-Azi: 0.00 Degrees

**GTI**

GYRO TECHNOLOGIES INC

**FIELD COPY ONLY (NOT DEFINITIVE)**

Depth Reference : GL

**DRILLOG MS GYRO SURVEY CALCULATIONS**

Filename: run1-01.ut

Minimum Curvature Method

Report Date/Time: 5/18/2011 / 22:09

Vaughn Energy Services

Rifle, Colorado

303-489-9231

Jay Hinman

National Hog Farm 21-21/05-123-20815

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	0.19	150.95	100.00	-0.14	0.08	-0.14	0.16	150.95	0.19
200.00	0.25	178.46	200.00	-0.50	0.17	-0.50	0.53	161.80	0.12
300.00	0.15	191.31	300.00	-0.84	0.15	-0.84	0.86	170.17	0.11
400.00	0.06	208.30	400.00	-1.02	0.09	-1.02	1.02	174.68	0.09
500.00	0.16	228.02	500.00	-1.16	-0.04	-1.16	1.16	181.74	0.10
600.00	0.30	262.78	600.00	-1.29	-0.40	-1.29	1.35	197.26	0.19
700.00	0.15	325.01	700.00	-1.21	-0.74	-1.21	1.42	211.18	0.27
800.00	0.43	305.19	800.00	-0.89	-1.12	-0.89	1.43	231.38	0.30
900.00	0.34	297.31	899.99	-0.54	-1.69	-0.54	1.78	252.38	0.10
1000.00	0.62	286.02	999.99	-0.25	-2.48	-0.25	2.49	264.25	0.29
1100.00	0.43	274.04	1099.99	-0.07	-3.38	-0.07	3.38	268.75	0.22
1200.00	0.44	266.41	1199.98	-0.07	-4.14	-0.07	4.14	269.02	0.06
1300.00	0.52	272.97	1299.98	-0.07	-4.97	-0.07	4.97	269.18	0.09
1400.00	0.36	284.39	1399.98	0.03	-5.72	0.03	5.72	270.30	0.18
1500.00	0.10	298.50	1499.97	0.15	-6.10	0.15	6.11	271.41	0.26
1600.00	0.07	299.72	1599.97	0.22	-6.24	0.22	6.24	272.06	0.03
1700.00	0.29	306.49	1699.97	0.40	-6.49	0.40	6.51	273.56	0.21
1800.00	0.63	297.47	1799.97	0.81	-7.18	0.81	7.23	276.40	0.35
1900.00	0.75	297.61	1899.96	1.36	-8.25	1.36	8.36	279.38	0.12
2000.00	0.79	289.82	1999.95	1.90	-9.48	1.90	9.67	281.33	0.11
2100.00	0.51	260.17	2099.95	2.06	-10.56	2.06	10.76	281.02	0.43
2200.00	0.37	258.04	2199.95	1.91	-11.31	1.91	11.47	279.61	0.14
2300.00	0.33	248.02	2299.94	1.74	-11.89	1.74	12.02	278.34	0.07
2400.00	0.26	233.11	2399.94	1.50	-12.34	1.50	12.43	276.92	0.10
2500.00	0.53	228.64	2499.94	1.05	-12.87	1.05	12.91	274.67	0.27
2600.00	0.21	212.58	2599.94	0.59	-13.32	0.59	13.33	272.53	0.34
2700.00	0.51	220.62	2699.94	0.10	-13.70	0.10	13.71	270.41	0.30
2800.00	0.35	218.51	2799.93	-0.47	-14.18	-0.47	14.19	268.09	0.16
2900.00	0.41	192.14	2899.93	-1.06	-14.44	-1.06	14.48	265.82	0.18
3000.00	0.47	202.54	2999.93	-1.78	-14.67	-1.78	14.78	263.08	0.10
3100.00	0.51	190.72	3099.92	-2.60	-14.91	-2.60	15.14	260.12	0.11
3200.00	0.11	175.12	3199.92	-3.13	-14.99	-3.13	15.31	258.20	0.41
3300.00	0.49	48.62	3299.92	-2.94	-14.66	-2.94	14.95	258.64	0.56
3400.00	0.97	34.21	3399.91	-1.96	-13.86	-1.96	14.00	261.94	0.51

<i>Measured Depth FT</i>	<i>Incl Angle Deg</i>	<i>Drift Direction Deg</i>	<i>TVD FT</i>	<i>+N/-S FT</i>	<i>+E/-W FT</i>	<i>Vertical Section FT</i>	<i>Closure Distance FT</i>	<i>Closure Direction Deg</i>	<i>Dogleg Severity Deg/100</i>
3500.00	1.73	23.79	3499.88	0.12	-12.78	0.12	12.78	270.53	0.80
3600.00	2.42	19.18	3599.82	3.50	-11.48	3.50	12.00	286.94	0.71
3700.00	2.42	12.67	3699.73	7.56	-10.32	7.56	12.79	306.22	0.28
3800.00	1.86	358.17	3799.66	11.24	-9.91	11.24	14.98	318.61	0.78
3900.00	1.43	335.12	3899.62	13.99	-10.48	13.99	17.48	323.17	0.78
4000.00	1.29	318.93	3999.59	15.97	-11.75	15.97	19.83	323.67	0.41
4100.00	1.30	307.12	4099.57	17.51	-13.39	17.51	22.04	322.59	0.27
4200.00	1.08	296.46	4199.54	18.61	-15.14	18.61	23.99	320.87	0.31
4300.00	0.38	255.45	4299.54	18.95	-16.31	18.95	25.00	319.29	0.83
4400.00	0.38	240.55	4399.53	18.70	-16.92	18.70	25.22	317.87	0.10
4500.00	0.29	236.20	4499.53	18.40	-17.41	18.40	25.33	316.59	0.09
4600.00	0.33	236.85	4599.53	18.10	-17.86	18.10	25.43	315.39	0.05
4700.00	0.64	237.26	4699.53	17.64	-18.57	17.64	25.62	313.53	0.31
4800.00	0.80	245.94	4799.52	17.06	-19.68	17.06	26.04	310.91	0.19
4900.00	1.59	267.16	4899.50	16.70	-21.71	16.70	27.39	307.57	0.90
5000.00	2.00	277.54	4999.45	16.86	-24.83	16.86	30.01	304.18	0.52
5100.00	2.76	269.59	5099.36	17.07	-28.97	17.07	33.63	300.51	0.82
5200.00	2.31	265.07	5199.26	16.88	-33.38	16.88	37.41	296.83	0.49
5300.00	2.29	259.42	5299.18	16.34	-37.36	16.34	40.77	293.63	0.23
5400.00	1.96	253.84	5399.11	15.50	-40.97	15.50	43.80	290.72	0.39
5500.00	1.89	251.46	5499.06	14.50	-44.17	14.50	46.49	288.17	0.10
5600.00	1.73	248.30	5599.01	13.42	-47.14	13.42	49.01	285.89	0.19
5700.00	1.31	245.24	5698.97	12.38	-49.58	12.38	51.10	284.02	0.42
5800.00	1.11	239.23	5798.95	11.41	-51.45	11.41	52.70	282.50	0.24
5900.00	1.08	233.42	5898.93	10.35	-53.04	10.35	54.04	281.04	0.11
6000.00	0.94	223.31	5998.92	9.19	-54.36	9.19	55.13	279.59	0.23
6100.00	0.99	208.82	6098.90	7.83	-55.34	7.83	55.89	278.05	0.25
6200.00	1.04	202.81	6198.89	6.24	-56.11	6.24	56.46	276.35	0.12
6300.00	1.65	199.90	6298.86	4.05	-56.95	4.05	57.09	274.07	0.61
6400.00	1.84	191.17	6398.81	1.13	-57.75	1.13	57.76	271.12	0.33
6480.00	1.83	193.27	6478.77	-1.37	-58.29	-1.37	58.31	268.65	0.08

HORIZONTAL DISPLACEMENT IS  
58.31 FEET AT 268.65 DEGREES