

**VES**

VAUGHN ENERGY SERVICES

Company: Noble Energy  
 Lease/Well: Spike State GWS C / 24-7  
 Location: S-24 T-4N R-64W  
 Rig Name: Production  
 State/County: Colorado / Weld County  
 Latitude: 40.30, Longitude: -104.50  
 GRID North is 0.65 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: 4/14/2011 / 05:06

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	0.03	356.53	100.00	0.02	0.00	0.02	0.02	356.53	0.03
200.00	0.03	325.55	200.00	0.07	-0.02	0.07	0.07	346.21	0.01
300.00	0.09	249.99	300.00	0.06	-0.10	0.06	0.12	301.12	0.08
400.00	0.11	139.70	400.00	-0.04	-0.11	-0.04	0.11	249.63	0.16
500.00	0.29	253.87	500.00	-0.18	-0.28	-0.18	0.34	237.04	0.35
600.00	0.36	313.70	600.00	-0.04	-0.75	-0.04	0.75	267.03	0.33
700.00	0.31	312.07	700.00	0.36	-1.17	0.36	1.23	287.01	0.04
800.00	0.54	277.35	799.99	0.60	-1.84	0.60	1.94	288.12	0.33
900.00	0.45	268.50	899.99	0.65	-2.70	0.65	2.77	283.61	0.12
1000.00	0.35	253.01	999.99	0.55	-3.38	0.55	3.42	279.28	0.14
1100.00	0.11	195.35	1099.99	0.37	-3.70	0.37	3.72	275.76	0.31
1200.00	0.31	312.32	1199.99	0.47	-3.92	0.47	3.95	276.78	0.37
1300.00	0.19	200.95	1299.99	0.49	-4.19	0.49	4.21	276.71	0.42
1400.00	0.17	38.40	1399.99	0.45	-4.15	0.45	4.18	276.25	0.36
1500.00	0.20	220.74	1499.99	0.44	-4.17	0.44	4.19	276.06	0.37
1600.00	0.18	111.49	1599.99	0.25	-4.13	0.25	4.14	273.52	0.31
1700.00	0.25	95.80	1699.98	0.17	-3.77	0.17	3.77	272.64	0.09
1800.00	0.30	106.26	1799.98	0.08	-3.30	0.08	3.30	271.36	0.07
1900.00	0.31	105.85	1899.98	-0.07	-2.78	-0.07	2.78	268.55	0.01
2000.00	0.40	77.10	1999.98	-0.07	-2.17	-0.07	2.18	268.24	0.20
2100.00	0.51	89.96	2099.98	0.01	-1.39	0.01	1.39	270.50	0.15
2200.00	1.06	86.90	2199.97	0.06	-0.01	0.06	0.06	347.57	0.55
2300.00	1.12	99.87	2299.95	-0.06	1.88	-0.06	1.88	91.68	0.25
2400.00	1.14	105.92	2399.93	-0.50	3.80	-0.50	3.83	97.43	0.12
2500.00	0.88	124.93	2499.91	-1.21	5.38	-1.21	5.51	102.64	0.42
2600.00	0.77	139.57	2599.90	-2.15	6.44	-2.15	6.79	108.50	0.24
2700.00	0.69	142.72	2699.90	-3.15	7.24	-3.15	7.90	113.48	0.08
2800.00	0.91	140.12	2799.89	-4.24	8.12	-4.24	9.16	117.57	0.22
2900.00	0.79	164.33	2899.88	-5.51	8.82	-5.51	10.40	122.01	0.38
3000.00	0.71	192.60	2999.87	-6.77	8.87	-6.77	11.16	127.37	0.37
3100.00	0.60	180.72	3099.86	-7.90	8.73	-7.90	11.77	132.16	0.17
3200.00	0.85	125.02	3199.85	-8.86	9.33	-8.86	12.86	133.51	0.71
3300.00	1.51	113.28	3299.83	-9.80	11.15	-9.80	14.84	131.33	0.70
3400.00	2.15	113.87	3399.78	-11.08	14.07	-11.08	17.91	128.22	0.64

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	2.36	113.55	3499.70	-12.67	17.68	-12.67	21.75	125.62	0.21
3600.00	2.88	109.45	3599.60	-14.33	21.94	-14.33	26.21	123.14	0.55
3700.00	2.59	115.00	3699.48	-16.12	26.36	-16.12	30.90	121.45	0.39
3800.00	3.07	112.04	3799.36	-18.08	30.88	-18.08	35.79	120.34	0.50
3900.00	3.49	110.61	3899.20	-20.15	36.21	-20.15	41.44	119.09	0.43
4000.00	3.69	112.47	3999.00	-22.45	42.04	-22.45	47.66	118.11	0.23
4100.00	3.85	112.52	4098.79	-24.97	48.11	-24.97	54.21	117.43	0.16
4200.00	4.23	102.91	4198.54	-27.08	54.81	-27.08	61.14	116.29	0.78
4300.00	4.45	102.01	4298.25	-28.71	62.21	-28.71	68.52	114.78	0.23
4400.00	4.36	97.55	4397.96	-30.02	69.77	-30.02	75.96	113.28	0.36
4500.00	4.46	97.02	4497.66	-30.99	77.39	-30.99	83.37	111.82	0.11
4600.00	3.80	98.87	4597.40	-31.98	84.53	-31.98	90.37	110.72	0.67
4700.00	2.91	94.41	4697.23	-32.69	90.33	-32.69	96.06	109.89	0.93
4800.00	2.21	87.92	4797.13	-32.81	94.79	-32.81	100.30	109.09	0.76
4900.00	2.25	92.72	4897.05	-32.83	98.67	-32.83	103.99	108.40	0.19
5000.00	1.69	106.25	4996.99	-33.34	102.05	-33.34	107.36	108.09	0.73
5100.00	1.31	126.00	5096.96	-34.42	104.38	-34.42	109.91	108.25	0.63
5200.00	1.25	140.53	5196.93	-35.94	106.00	-35.94	111.93	108.73	0.33
5300.00	1.19	157.28	5296.91	-37.73	107.10	-37.73	113.55	109.41	0.36
5400.00	1.12	175.74	5396.89	-39.66	107.57	-39.66	114.65	110.24	0.38
5500.00	1.09	180.40	5496.87	-41.59	107.63	-41.59	115.39	111.13	0.09
5600.00	0.76	211.99	5596.86	-43.10	107.27	-43.10	115.61	111.89	0.59
5700.00	1.70	227.52	5696.84	-44.67	105.83	-44.67	114.87	112.89	0.99
5800.00	1.92	253.60	5796.79	-46.15	103.12	-46.15	112.98	114.11	0.84
5900.00	1.35	241.83	5896.75	-47.18	100.48	-47.18	111.00	115.15	0.66
6000.00	1.22	246.59	5996.72	-48.15	98.47	-48.15	109.61	116.06	0.17
6100.00	1.09	252.04	6096.70	-48.87	96.59	-48.87	108.25	116.84	0.17
6200.00	1.02	253.64	6196.69	-49.41	94.83	-49.41	106.93	117.52	0.07
6300.00	0.84	250.69	6296.67	-49.90	93.29	-49.90	105.80	118.15	0.19
6400.00	0.68	250.12	6396.66	-50.35	92.04	-50.35	104.91	118.68	0.16
6500.00	0.76	250.36	6496.66	-50.77	90.86	-50.77	104.09	119.19	0.08
6600.00	1.08	240.31	6596.64	-51.46	89.43	-51.46	103.17	119.92	0.36
6700.00	1.03	229.08	6696.63	-52.51	87.93	-52.51	102.42	120.84	0.21
6790.00	1.20	229.08	6786.61	-53.65	86.62	-53.65	101.89	121.77	0.19
HORIZONTAL DISPLACEMENT IS 101.89 FEET AT 121.77 DEGREES									