

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy
 Lease/Well: Spike State GWS / D16-12
 Location: S-16 T-3N R-64W
 Rig Name: Production
 State/County: Colorado / Weld County
 Latitude: 40.22, Longitude: -104.56
 GRID North is 0.60 Degrees East of True North
 VS-Azi: 0.00 Degrees

GTI

GYRO TECHNOLOGIES, INC

FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: inrun_ed.ut

Minimum Curvature Method

Report Date/Time: 12/18/2010 / 11:09

Vaughn Energy Services
 Fort Worth, Texas
 817-741-3610
 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	0.09	183.86	100.00	-0.08	-0.01	-0.08	0.08	183.86	0.09
200.00	0.17	108.73	200.00	-0.20	0.13	-0.20	0.24	148.16	0.17
300.00	0.19	57.68	300.00	-0.16	0.40	-0.16	0.43	112.02	0.15
400.00	0.22	37.12	400.00	0.08	0.66	0.08	0.66	83.42	0.08
500.00	0.35	9.79	500.00	0.53	0.82	0.53	0.98	57.21	0.19
600.00	0.29	330.90	600.00	1.05	0.75	1.05	1.29	35.63	0.22
700.00	0.35	355.42	699.99	1.57	0.61	1.57	1.69	21.11	0.15
800.00	0.37	304.78	799.99	2.06	0.32	2.06	2.09	8.82	0.31
900.00	0.36	359.70	899.99	2.56	0.06	2.56	2.56	1.24	0.33
1000.00	0.46	354.08	999.99	3.27	0.01	3.27	3.27	0.21	0.11
1100.00	0.45	55.19	1099.99	3.90	0.29	3.90	3.91	4.31	0.47
1200.00	0.41	101.26	1199.98	4.05	0.97	4.05	4.17	13.48	0.34
1300.00	0.43	87.23	1299.98	4.00	1.70	4.00	4.35	23.06	0.11
1400.00	0.47	82.06	1399.98	4.07	2.48	4.07	4.77	31.39	0.05
1500.00	0.38	85.56	1499.97	4.16	3.22	4.16	5.26	37.80	0.09
1600.00	0.42	77.04	1599.97	4.26	3.91	4.26	5.79	42.54	0.07
1700.00	0.47	66.26	1699.97	4.51	4.64	4.51	6.47	45.83	0.10
1800.00	0.51	53.57	1799.97	4.94	5.38	4.94	7.30	47.42	0.11
1900.00	0.64	309.19	1899.96	5.55	5.30	5.55	7.68	43.65	0.91
2000.00	0.70	283.25	1999.96	6.05	4.27	6.05	7.40	35.24	0.31
2100.00	1.17	273.13	2099.94	6.24	2.66	6.24	6.79	23.10	0.50
2200.00	1.38	305.42	2199.92	7.00	0.66	7.00	7.03	5.42	0.74
2300.00	1.52	330.08	2299.89	8.84	-0.98	8.84	8.90	353.69	0.63
2400.00	1.76	357.08	2399.85	11.52	-1.72	11.52	11.65	351.53	0.80
2500.00	1.77	9.70	2499.80	14.58	-1.53	14.58	14.66	353.99	0.39
2600.00	1.86	12.94	2599.75	17.68	-0.91	17.68	17.70	357.05	0.14
2700.00	1.89	7.42	2699.70	20.89	-0.34	20.89	20.89	359.08	0.18
2800.00	1.92	0.61	2799.64	24.19	-0.11	24.19	24.19	359.75	0.23
2900.00	1.80	333.84	2899.59	27.28	-0.78	27.28	27.29	358.36	0.87
3000.00	1.87	303.17	2999.54	29.58	-2.84	29.58	29.71	354.52	0.97
3100.00	1.92	283.22	3099.49	30.85	-5.83	30.85	31.40	349.29	0.66
3200.00	1.91	306.76	3199.44	32.23	-8.80	32.23	33.41	344.72	0.78
3300.00	1.59	336.05	3299.39	34.50	-10.70	34.50	36.12	342.76	0.94
3400.00	1.64	5.29	3399.35	37.19	-11.13	37.19	38.83	343.33	0.82

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	1.31	27.19	3499.32	39.64	-10.48	39.64	41.00	345.19	0.65
3600.00	1.13	352.80	3599.30	41.64	-10.08	41.64	42.84	346.39	0.74
3700.00	1.18	16.20	3699.28	43.60	-9.92	43.60	44.72	347.18	0.47
3800.00	0.98	33.00	3799.26	45.31	-9.16	45.31	46.23	348.57	0.37
3900.00	0.95	59.89	3899.25	46.44	-7.98	46.44	47.12	350.25	0.45
4000.00	0.84	71.22	3999.24	47.10	-6.57	47.10	47.55	352.06	0.21
4100.00	0.90	81.17	4099.22	47.45	-5.10	47.45	47.72	353.86	0.16
4200.00	0.84	92.91	4199.21	47.53	-3.60	47.53	47.67	355.67	0.19
4300.00	0.29	8.80	4299.21	47.75	-2.83	47.75	47.83	356.60	0.86
4400.00	0.33	16.79	4399.21	48.28	-2.71	48.28	48.35	356.79	0.06
4500.00	0.12	7.27	4499.21	48.65	-2.62	48.65	48.72	356.92	0.21
4600.00	0.16	126.10	4599.21	48.67	-2.49	48.67	48.74	357.07	0.24
4700.00	0.51	204.89	4699.20	48.19	-2.57	48.19	48.26	356.95	0.50
4800.00	0.95	127.30	4799.20	47.29	-2.10	47.29	47.33	357.46	0.97
4900.00	1.03	104.64	4899.18	46.56	-0.57	46.56	46.56	359.30	0.40
5000.00	0.90	74.44	4999.17	46.54	1.06	46.54	46.55	1.30	0.52
5100.00	0.75	50.97	5099.16	47.17	2.33	47.17	47.22	2.82	0.36
5200.00	0.50	72.05	5199.15	47.72	3.25	47.72	47.83	3.90	0.34
5300.00	0.15	112.83	5299.15	47.80	3.79	47.80	47.95	4.53	0.40
5400.00	0.19	86.17	5399.15	47.76	4.07	47.76	47.93	4.87	0.09
5500.00	0.20	336.59	5499.15	47.93	4.17	47.93	48.11	4.97	0.31
5600.00	0.34	322.31	5599.15	48.32	3.92	48.32	48.48	4.64	0.15
5700.00	0.39	111.63	5699.15	48.42	4.06	48.42	48.59	4.79	0.71
5800.00	0.31	115.52	5799.15	48.18	4.62	48.18	48.40	5.48	0.09
5900.00	0.49	63.92	5899.15	48.25	5.25	48.25	48.54	6.21	0.39
6000.00	0.16	174.73	5999.14	48.30	5.65	48.30	48.63	6.67	0.57
6100.00	0.06	166.48	6099.14	48.12	5.68	48.12	48.45	6.73	0.10
6200.00	0.47	185.54	6199.14	47.66	5.65	47.66	48.00	6.76	0.42
6300.00	0.41	196.08	6299.14	46.91	5.51	46.91	47.24	6.70	0.10
6400.00	0.35	147.63	6399.14	46.31	5.57	46.31	46.65	6.86	0.32
6500.00	0.21	123.25	6499.14	45.96	5.89	45.96	46.33	7.30	0.18
6600.00	0.74	186.84	6599.13	45.21	5.96	45.21	45.60	7.52	0.68
6700.00	0.27	157.07	6699.13	44.35	5.98	44.35	44.75	7.68	0.52
6800.00	0.68	181.25	6799.13	43.53	6.06	43.53	43.95	7.93	0.44
6900.00	0.47	166.08	6899.12	42.54	6.15	42.54	42.99	8.22	0.26

<div> HORIZONTAL DISPLACEMENT IS 42.99 FEET AT 8.22 DEGREES </div>
