

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy
 Lease/Well: National Hog Farm / 32-21
 Location: S-21 T-5N R-63W
 Rig Name: Production
 State/County: Colorado/ Weld County
 Latitude: 40.39, Longitude: -104.44
 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 : RKB = Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: inrun_ed.ut

Minimum Curvature Method

Report Date/Time: 6/15/2011 / 13:05

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	0.63	8.12	100.00	0.54	0.08	0.54	0.55	8.12	0.63
200.00	0.62	24.96	199.99	1.57	0.38	1.57	1.62	13.66	0.18
300.00	0.48	27.45	299.99	2.43	0.80	2.43	2.56	18.25	0.15
400.00	0.32	25.31	399.99	3.05	1.11	3.05	3.25	20.02	0.16
500.00	0.36	14.64	499.98	3.61	1.31	3.61	3.84	19.96	0.08
600.00	0.42	1.17	599.98	4.28	1.40	4.28	4.50	18.09	0.11
700.00	0.40	354.11	699.98	4.99	1.37	4.99	5.18	15.33	0.05
800.00	0.44	358.47	799.98	5.73	1.32	5.73	5.88	13.00	0.05
900.00	0.39	342.76	899.97	6.44	1.21	6.44	6.55	10.65	0.13
1000.00	0.45	335.31	999.97	7.12	0.95	7.12	7.18	7.58	0.08
1100.00	0.46	333.63	1099.97	7.83	0.61	7.83	7.86	4.43	0.02
1200.00	0.56	324.07	1199.96	8.59	0.14	8.59	8.59	0.94	0.14
1300.00	0.34	349.67	1299.96	9.28	-0.20	9.28	9.28	358.75	0.30
1400.00	0.45	349.18	1399.96	9.96	-0.33	9.96	9.97	358.11	0.11
1500.00	0.11	272.88	1499.96	10.35	-0.50	10.35	10.36	357.23	0.44
1600.00	0.16	18.85	1599.96	10.49	-0.55	10.49	10.51	356.98	0.22
1700.00	0.19	217.88	1699.96	10.50	-0.61	10.50	10.51	356.68	0.35
1800.00	0.29	293.83	1799.96	10.47	-0.94	10.47	10.51	354.88	0.30
1900.00	0.25	221.83	1899.95	10.41	-1.31	10.41	10.49	352.82	0.31
2000.00	0.09	226.71	1999.95	10.19	-1.51	10.19	10.30	351.56	0.16
2100.00	0.28	128.37	2099.95	9.99	-1.38	9.99	10.08	352.15	0.31
2200.00	0.68	120.07	2199.95	9.53	-0.67	9.53	9.56	355.98	0.41
2300.00	1.13	100.48	2299.94	9.06	0.81	9.06	9.09	5.14	0.54
2400.00	1.48	102.06	2399.91	8.61	3.04	8.61	9.13	19.47	0.35
2500.00	1.50	107.93	2499.88	7.94	5.55	7.94	9.68	34.96	0.15
2600.00	1.56	100.63	2599.84	7.28	8.14	7.28	10.92	48.17	0.20
2700.00	1.55	102.40	2699.81	6.74	10.80	6.74	12.73	58.02	0.05
2800.00	1.51	103.32	2799.77	6.15	13.40	6.15	14.74	65.36	0.04
2900.00	1.38	101.54	2899.74	5.60	15.86	5.60	16.82	70.56	0.14
3000.00	0.92	111.56	2999.72	5.07	17.79	5.07	18.50	74.11	0.50
3100.00	0.53	151.33	3099.71	4.36	18.76	4.36	19.26	76.90	0.62
3200.00	0.85	200.27	3199.70	3.26	18.72	3.26	19.00	80.13	0.65
3300.00	1.19	205.16	3299.69	1.62	18.02	1.62	18.10	84.87	0.35
3400.00	1.16	240.48	3399.67	0.18	16.70	0.18	16.70	89.39	0.71

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	1.34	216.30	3499.64	-1.27	15.12	-1.27	15.18	94.79	0.55
3600.00	1.29	240.01	3599.62	-2.77	13.46	-2.77	13.74	101.64	0.54
3700.00	1.30	229.96	3699.59	-4.07	11.61	-4.07	12.30	109.30	0.23
3800.00	1.45	255.05	3799.57	-5.12	9.52	-5.12	10.81	118.28	0.61
3900.00	1.49	247.05	3899.53	-5.96	7.11	-5.96	9.27	129.97	0.21
4000.00	1.92	256.91	3999.49	-6.84	4.28	-6.84	8.07	147.97	0.51
4100.00	2.32	261.61	4099.42	-7.52	0.65	-7.52	7.54	175.08	0.44
4200.00	2.48	267.30	4199.33	-7.91	-3.52	-7.91	8.66	203.96	0.28
4300.00	2.51	265.58	4299.24	-8.18	-7.86	-8.18	11.35	223.86	0.08
4400.00	2.35	269.97	4399.15	-8.35	-12.11	-8.35	14.71	235.39	0.25
4500.00	2.40	270.67	4499.06	-8.33	-16.25	-8.33	18.26	242.86	0.06
4600.00	1.94	260.15	4598.99	-8.60	-20.02	-8.60	21.79	246.76	0.61
4700.00	1.85	259.53	4698.93	-9.18	-23.28	-9.18	25.03	248.48	0.09
4800.00	1.68	252.76	4798.89	-9.91	-26.27	-9.91	28.07	249.33	0.27
4900.00	1.34	253.45	4898.85	-10.67	-28.78	-10.67	30.70	249.65	0.34
5000.00	1.51	230.42	4998.82	-11.85	-30.92	-11.85	33.11	249.04	0.59
5100.00	1.51	214.07	5098.79	-13.78	-32.67	-13.78	35.46	247.13	0.43
5200.00	1.31	188.92	5198.76	-16.00	-33.59	-16.00	37.20	244.53	0.65
5300.00	1.64	183.80	5298.73	-18.55	-33.86	-18.55	38.61	241.28	0.36
5400.00	1.46	162.49	5398.69	-21.19	-33.57	-21.19	39.70	237.73	0.60
5500.00	1.79	144.36	5498.65	-23.68	-32.27	-23.68	40.03	233.73	0.61
5600.00	1.95	134.73	5598.60	-26.15	-30.15	-26.15	39.91	229.07	0.35
5700.00	1.89	127.60	5698.54	-28.35	-27.64	-28.35	39.59	224.26	0.25
5800.00	1.53	122.43	5798.50	-30.08	-25.20	-30.08	39.24	219.96	0.39
5900.00	1.29	118.55	5898.47	-31.33	-23.09	-31.33	38.92	216.39	0.26
6000.00	1.07	114.19	5998.44	-32.25	-21.25	-32.25	38.62	213.38	0.23
6100.00	1.25	111.55	6098.42	-33.03	-19.38	-33.03	38.30	210.40	0.19
6200.00	1.77	113.11	6198.39	-34.04	-16.95	-34.04	38.02	206.47	0.52
6300.00	2.39	112.66	6298.32	-35.44	-13.61	-35.44	37.97	201.01	0.62
6400.00	1.72	97.14	6398.26	-36.43	-10.20	-36.43	37.83	195.65	0.86
6500.00	0.99	77.32	6498.23	-36.43	-7.88	-36.43	37.27	192.20	0.85
6600.00	0.28	355.21	6598.23	-35.99	-7.05	-35.99	36.68	191.09	0.99
6700.00	0.30	99.36	6698.22	-35.79	-6.82	-35.79	36.44	190.79	0.46
6800.00	0.48	201.77	6798.22	-36.22	-6.72	-36.22	36.84	190.51	0.62
6900.00	0.79	226.50	6898.22	-37.09	-7.37	-37.09	37.81	191.24	0.40
7000.00	1.03	175.01	6998.21	-38.46	-7.79	-38.46	39.24	191.45	0.82
HORIZONTAL DISPLACEMENT IS 39.24 FEET AT 191.45 DEGREES									