

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy
 Lease/Well: National Hog Farm / 44-21
 Location: S-21 T-5N R-63W
 Rig Name: Production
 State/County: Colorado / Weld County
 Latitude: 40.38, Longitude: -104.43
 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: 6/9/2011 / 12:29

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	0.73	318.26	100.00	0.48	-0.43	0.48	0.64	318.26	0.73
200.00	0.50	314.48	199.99	1.26	-1.16	1.26	1.72	317.30	0.23
300.00	0.24	286.83	299.99	1.63	-1.68	1.63	2.34	314.13	0.31
400.00	0.22	2.14	399.99	1.89	-1.88	1.89	2.66	315.15	0.28
500.00	0.43	16.37	499.99	2.44	-1.76	2.44	3.01	324.17	0.22
600.00	0.45	10.65	599.98	3.19	-1.58	3.19	3.56	333.59	0.05
700.00	0.44	14.10	699.98	3.95	-1.42	3.95	4.20	340.27	0.03
800.00	0.44	6.04	799.98	4.71	-1.28	4.71	4.89	344.78	0.06
900.00	0.47	10.66	899.97	5.51	-1.17	5.51	5.63	348.05	0.05
1000.00	0.40	8.29	999.97	6.26	-1.04	6.26	6.35	350.58	0.08
1100.00	0.46	17.32	1099.97	6.99	-0.87	6.99	7.04	352.92	0.09
1200.00	0.58	8.59	1199.96	7.87	-0.67	7.87	7.90	355.11	0.14
1300.00	0.55	5.64	1299.96	8.85	-0.55	8.85	8.86	356.43	0.04
1400.00	0.56	2.25	1399.96	9.81	-0.48	9.81	9.82	357.17	0.03
1500.00	0.40	46.12	1499.95	10.54	-0.21	10.54	10.54	358.85	0.38
1600.00	0.48	45.20	1599.95	11.07	0.34	11.07	11.08	1.75	0.08
1700.00	0.47	33.88	1699.95	11.71	0.86	11.71	11.74	4.21	0.09
1800.00	0.64	89.88	1799.94	12.05	1.65	12.05	12.16	7.79	0.54
1900.00	1.20	108.96	1899.93	11.71	3.20	11.71	12.14	15.29	0.63
2000.00	1.01	130.33	1999.91	10.80	4.87	10.80	11.84	24.26	0.45
2100.00	0.83	145.50	2099.90	9.63	5.95	9.63	11.32	31.72	0.30
2200.00	0.80	146.07	2199.89	8.45	6.75	8.45	10.81	38.65	0.03
2300.00	0.58	141.53	2299.88	7.47	7.46	7.47	10.56	44.94	0.23
2400.00	0.65	142.18	2399.87	6.63	8.12	6.63	10.48	50.76	0.08
2500.00	0.64	137.29	2499.87	5.77	8.84	5.77	10.56	56.88	0.06
2600.00	0.69	137.89	2599.86	4.92	9.62	4.92	10.81	62.93	0.05
2700.00	0.48	150.49	2699.86	4.11	10.23	4.11	11.03	68.14	0.24
2800.00	0.45	235.46	2799.85	3.52	10.12	3.52	10.71	70.84	0.63
2900.00	0.82	264.82	2899.85	3.23	9.09	3.23	9.64	70.43	0.48
3000.00	1.66	262.57	2999.82	2.98	6.94	2.98	7.55	66.77	0.84
3100.00	2.08	261.13	3099.77	2.51	3.72	2.51	4.49	55.93	0.42
3200.00	2.08	254.41	3199.70	1.75	0.18	1.75	1.75	5.83	0.24
3300.00	1.85	258.56	3299.65	0.94	-3.15	0.94	3.29	286.57	0.27
3400.00	1.98	254.11	3399.59	0.15	-6.39	0.15	6.40	271.30	0.19

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	1.85	264.99	3499.53	-0.47	-9.66	-0.47	9.67	267.23	0.39
3600.00	1.99	256.86	3599.48	-1.00	-12.96	-1.00	12.99	265.57	0.31
3700.00	1.91	267.50	3699.42	-1.47	-16.32	-1.47	16.38	264.84	0.37
3800.00	1.89	267.97	3799.37	-1.60	-19.63	-1.60	19.70	265.33	0.03
3900.00	1.95	262.51	3899.31	-1.88	-22.96	-1.88	23.04	265.31	0.19
4000.00	1.84	264.20	3999.26	-2.27	-26.24	-2.27	26.34	265.06	0.12
4100.00	2.16	259.66	4099.19	-2.77	-29.70	-2.77	29.83	264.68	0.35
4200.00	2.08	253.39	4199.13	-3.62	-33.29	-3.62	33.49	263.79	0.24
4300.00	1.93	244.17	4299.06	-4.88	-36.55	-4.88	36.87	262.40	0.35
4400.00	2.19	236.83	4399.00	-6.66	-39.67	-6.66	40.22	260.47	0.37
4500.00	2.36	223.72	4498.92	-9.19	-42.68	-9.19	43.66	257.85	0.54
4600.00	2.18	215.61	4598.84	-12.22	-45.21	-12.22	46.83	254.88	0.36
4700.00	1.93	235.69	4698.78	-14.72	-47.71	-14.72	49.93	252.86	0.76
4800.00	1.99	248.07	4798.72	-16.31	-50.71	-16.31	53.27	252.17	0.43
4900.00	1.58	262.24	4898.67	-17.15	-53.69	-17.15	56.36	252.29	0.60
5000.00	1.09	263.88	4998.65	-17.44	-56.00	-17.44	58.65	252.71	0.49
5100.00	0.65	301.89	5098.64	-17.24	-57.43	-17.24	59.96	253.29	0.70
5200.00	0.42	12.93	5198.63	-16.58	-57.82	-16.58	60.15	254.00	0.65
5300.00	0.27	50.77	5298.63	-16.07	-57.56	-16.07	59.76	254.40	0.27
5400.00	0.23	339.21	5398.63	-15.73	-57.45	-15.73	59.56	254.68	0.29
5500.00	0.24	74.35	5498.63	-15.49	-57.32	-15.49	59.38	254.88	0.34
5600.00	0.20	329.12	5598.63	-15.29	-57.21	-15.29	59.22	255.04	0.35
5700.00	0.13	19.34	5698.63	-15.03	-57.26	-15.03	59.20	255.30	0.15
5800.00	0.16	199.87	5798.63	-15.05	-57.27	-15.05	59.22	255.28	0.30
5900.00	0.27	229.55	5898.63	-15.33	-57.50	-15.33	59.51	255.07	0.15
6000.00	0.39	222.59	5998.63	-15.74	-57.91	-15.74	60.01	254.80	0.13
6100.00	0.55	257.47	6098.62	-16.09	-58.61	-16.09	60.78	254.65	0.32
6200.00	1.32	235.41	6198.61	-16.85	-60.03	-16.85	62.35	254.32	0.84
6300.00	2.11	241.93	6298.56	-18.37	-62.60	-18.37	65.24	253.64	0.81
6400.00	3.02	240.41	6398.46	-20.54	-66.52	-20.54	69.62	252.84	0.91
6500.00	3.93	237.96	6498.28	-23.66	-71.72	-23.66	75.52	251.74	0.92
6600.00	3.27	228.43	6598.08	-27.37	-76.76	-27.37	81.49	250.37	0.89

HORIZONTAL DISPLACEMENT IS 81.49 FEET AT 250.37 DEGREES									
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