

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy
Lease/Well: National Hog Farm / 41-21

Location: S-21 T-5N R-63W

Rig Name: Production

State/County: Colorado / Weld County

Latitude: 40.39, 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: inurn_ed.ut

Minimum Curvature Method

Report Date/Time: 6/15/2011 / 13:14

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	0.44	28.82	100.00	0.33	0.18	0.33	0.38	28.82	0.44
200.00	0.62	350.34	200.00	1.20	0.28	1.20	1.24	12.99	0.39
300.00	0.56	355.15	299.99	2.22	0.15	2.22	2.23	3.75	0.08
400.00	0.69	359.03	399.98	3.31	0.09	3.31	3.31	1.63	0.14
500.00	0.53	18.80	499.98	4.35	0.23	4.35	4.36	3.06	0.26
600.00	0.23	51.09	599.98	4.91	0.54	4.91	4.94	6.22	0.36
700.00	0.46	318.46	699.97	5.34	0.42	5.34	5.35	4.51	0.52
800.00	0.38	15.93	799.97	5.96	0.24	5.96	5.96	2.34	0.41
900.00	0.34	346.07	899.97	6.56	0.26	6.56	6.56	2.30	0.19
1000.00	0.60	323.27	999.97	7.26	-0.12	7.26	7.26	359.07	0.31
1100.00	0.82	323.51	1099.96	8.25	-0.85	8.25	8.29	354.10	0.22
1200.00	0.85	7.44	1199.95	9.56	-1.18	9.56	9.63	352.96	0.62
1300.00	0.89	354.27	1299.94	11.06	-1.16	11.06	11.12	354.00	0.20
1400.00	0.32	299.43	1399.93	11.96	-1.48	11.96	12.06	352.94	0.75
1500.00	0.64	3.41	1499.93	12.66	-1.69	12.66	12.77	352.39	0.58
1600.00	0.47	316.00	1599.93	13.51	-1.94	13.51	13.65	351.82	0.47
1700.00	0.40	77.85	1699.92	13.88	-1.89	13.88	14.00	352.25	0.76
1800.00	1.04	83.66	1799.92	14.05	-0.65	14.05	14.07	357.37	0.64
1900.00	1.37	93.17	1899.89	14.08	1.45	14.08	14.16	5.89	0.39
2000.00	1.78	90.94	1999.86	13.99	4.20	13.99	14.61	16.71	0.41
2100.00	1.74	89.28	2099.81	13.99	7.27	13.99	15.76	27.47	0.06
2200.00	1.75	76.31	2199.76	14.37	10.27	14.37	17.66	35.57	0.39
2300.00	1.80	72.54	2299.71	15.20	13.26	15.20	20.17	41.10	0.13
2400.00	1.48	74.77	2399.67	16.01	16.01	16.01	22.64	44.99	0.33
2500.00	1.64	76.66	2499.64	16.68	18.65	16.68	25.02	48.19	0.17
2600.00	1.36	87.50	2599.60	17.07	21.23	17.07	27.24	51.21	0.40
2700.00	1.22	76.62	2699.58	17.36	23.44	17.36	29.17	53.48	0.28
2800.00	1.43	78.98	2799.55	17.85	25.70	17.85	31.29	55.22	0.22
2900.00	1.49	96.70	2899.52	17.93	28.21	17.93	33.43	57.56	0.45
3000.00	1.01	135.56	2999.50	17.15	30.12	17.15	34.66	60.34	0.95
3100.00	0.80	168.74	3099.48	15.84	30.87	15.84	34.70	62.84	0.55
3200.00	0.60	249.93	3199.48	14.98	30.52	14.98	33.99	63.86	0.92
3300.00	0.76	217.97	3299.47	14.28	29.62	14.28	32.88	64.26	0.40
3400.00	0.27	274.84	3399.47	13.78	28.98	13.78	32.09	64.58	0.65

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	0.58	164.16	3499.47	13.31	28.89	13.31	31.80	65.26	0.72
3600.00	0.50	148.54	3599.46	12.45	29.25	12.45	31.79	66.95	0.17
3700.00	0.23	214.13	3699.46	11.90	29.37	11.90	31.69	67.94	0.46
3800.00	0.40	140.74	3799.46	11.47	29.48	11.47	31.63	68.74	0.40
3900.00	0.86	210.55	3899.45	10.56	29.31	10.56	31.16	70.20	0.81
4000.00	1.49	229.61	3999.43	9.07	27.94	9.07	29.38	72.02	0.74
4100.00	2.08	227.42	4099.38	6.99	25.61	6.99	26.55	74.72	0.59
4200.00	2.79	225.57	4199.29	4.06	22.54	4.06	22.90	79.78	0.71
4300.00	2.84	224.50	4299.17	0.59	19.06	0.59	19.07	88.23	0.07
4400.00	2.96	211.54	4399.04	-3.38	15.97	-3.38	16.32	101.95	0.66
4500.00	3.10	208.16	4498.91	-7.96	13.34	-7.96	15.54	120.83	0.23
4600.00	2.89	200.48	4598.77	-12.71	11.18	-12.71	16.93	138.66	0.45
4700.00	2.49	190.77	4698.66	-17.21	9.89	-17.21	19.86	150.11	0.61
4800.00	2.32	180.39	4798.57	-21.37	9.47	-21.37	23.38	156.09	0.47
4900.00	1.71	203.24	4898.51	-24.77	8.87	-24.77	26.31	160.30	0.99
5000.00	1.28	229.62	4998.48	-26.87	7.43	-26.87	27.88	164.54	0.80
5100.00	1.17	263.73	5098.46	-27.70	5.57	-27.70	28.26	168.64	0.73
5200.00	1.33	271.28	5198.43	-27.79	3.40	-27.79	28.00	173.03	0.23
5300.00	1.43	280.74	5298.40	-27.53	1.01	-27.53	27.55	177.89	0.25
5400.00	1.49	289.01	5398.37	-26.87	-1.44	-26.87	26.91	183.07	0.22
5500.00	1.46	285.83	5498.34	-26.10	-3.89	-26.10	26.39	188.48	0.09
5600.00	1.82	284.36	5598.30	-25.36	-6.66	-25.36	26.22	194.70	0.36
5700.00	1.99	286.35	5698.24	-24.48	-9.85	-24.48	26.39	201.92	0.18
5800.00	1.81	289.43	5798.19	-23.47	-13.00	-23.47	26.83	208.99	0.20
5900.00	1.86	266.18	5898.14	-23.05	-16.11	-23.05	28.12	214.95	0.74
6000.00	1.28	237.15	5998.10	-23.77	-18.67	-23.77	30.22	218.15	0.97
6100.00	0.79	218.53	6098.08	-24.91	-20.03	-24.91	31.97	218.81	0.59
6200.00	0.33	260.78	6198.08	-25.49	-20.74	-25.49	32.87	219.14	0.59
6300.00	0.27	215.47	6298.08	-25.73	-21.16	-25.73	33.31	219.44	0.24
6400.00	0.28	236.50	6398.08	-26.05	-21.50	-26.05	33.78	219.53	0.10
6500.00	0.56	167.09	6498.07	-26.66	-21.59	-26.66	34.31	219.00	0.53
6600.00	0.14	252.92	6598.07	-27.17	-21.60	-27.17	34.71	218.48	0.57

HORIZONTAL DISPLACEMENT IS 34.71 FEET AT 218.48 DEGREES									
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