

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy

Lease/Well: Leanord C / 21-16

Location: S-21 T-4N R-64W

Rig Name: Production

State/County: Colorado / Weld County

Latitude: 40.29, Longitude: -104.55

GRID North is 0.61 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: 3/15/2011 / 12:54

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	0.55	4.31	100.00	0.48	0.04	0.48	0.48	4.31	0.55
200.00	0.40	18.33	200.00	1.28	0.18	1.28	1.29	8.02	0.19
300.00	0.33	27.89	299.99	1.87	0.43	1.87	1.91	12.84	0.09
400.00	0.21	9.60	399.99	2.30	0.59	2.30	2.38	14.42	0.15
500.00	0.31	51.91	499.99	2.65	0.83	2.65	2.78	17.47	0.21
600.00	0.44	82.23	599.99	2.87	1.42	2.87	3.20	26.43	0.23
700.00	0.35	66.03	699.99	3.04	2.08	3.04	3.68	34.38	0.14
800.00	0.41	17.69	799.98	3.50	2.46	3.50	4.28	35.12	0.31
900.00	0.31	321.62	899.98	4.06	2.40	4.06	4.72	30.62	0.35
1000.00	0.43	324.20	999.98	4.58	2.01	4.58	5.00	23.72	0.12
1100.00	0.48	330.84	1099.98	5.25	1.59	5.25	5.49	16.83	0.07
1200.00	0.53	331.68	1199.97	6.02	1.17	6.02	6.13	10.97	0.05
1300.00	0.51	289.08	1299.97	6.57	0.53	6.57	6.59	4.57	0.38
1400.00	0.30	8.97	1399.97	6.97	0.14	6.97	6.97	1.16	0.55
1500.00	0.32	358.58	1499.97	7.51	0.17	7.51	7.51	1.33	0.06
1600.00	0.53	2.16	1599.96	8.25	0.18	8.25	8.25	1.28	0.21
1700.00	0.51	340.99	1699.96	9.13	0.06	9.13	9.13	0.35	0.19
1800.00	0.71	352.01	1799.95	10.17	-0.18	10.17	10.17	359.00	0.23
1900.00	0.65	317.27	1899.95	11.21	-0.65	11.21	11.23	356.68	0.41
2000.00	0.74	333.35	1999.94	12.20	-1.33	12.20	12.28	353.80	0.21
2100.00	0.68	327.44	2099.93	13.28	-1.94	13.28	13.42	351.71	0.09
2200.00	0.37	356.92	2199.93	14.11	-2.27	14.11	14.29	350.84	0.40
2300.00	0.32	336.73	2299.93	14.68	-2.40	14.68	14.88	350.71	0.13
2400.00	0.08	300.39	2399.93	14.97	-2.57	14.97	15.19	350.26	0.26
2500.00	0.23	249.96	2499.93	14.94	-2.82	14.94	15.20	349.30	0.19
2600.00	0.07	230.90	2599.93	14.83	-3.06	14.83	15.14	348.33	0.17
2700.00	0.32	264.86	2699.92	14.76	-3.39	14.76	15.15	347.06	0.27
2800.00	0.12	347.06	2799.92	14.84	-3.70	14.84	15.29	346.01	0.33
2900.00	0.24	179.73	2899.92	14.73	-3.72	14.73	15.19	345.83	0.36
3000.00	1.57	101.23	2999.91	14.25	-2.37	14.25	14.45	350.54	1.54
3100.00	2.71	108.06	3099.84	13.25	1.22	13.25	13.31	5.26	1.17
3200.00	3.97	108.64	3199.67	11.41	6.75	11.41	13.26	30.60	1.25
3300.00	6.28	106.36	3299.26	8.76	15.28	8.76	17.61	60.16	2.33
3400.00	7.82	106.17	3398.50	5.33	27.06	5.33	27.58	78.86	1.53

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	8.60	108.31	3497.48	1.08	40.69	1.08	40.70	88.48	0.85
3600.00	9.17	111.06	3596.28	-4.13	55.23	-4.13	55.38	94.28	0.71
3700.00	8.94	113.10	3695.03	-10.04	69.81	-10.04	70.53	98.19	0.40
3800.00	8.94	112.37	3793.82	-16.05	84.14	-16.05	85.66	100.80	0.11
3900.00	9.24	110.97	3892.56	-21.88	98.82	-21.88	101.22	102.48	0.37
4000.00	8.44	110.08	3991.37	-27.27	113.21	-27.27	116.45	103.54	0.81
4100.00	8.61	108.49	4090.27	-32.16	127.21	-32.16	131.21	104.19	0.29
4200.00	8.64	103.35	4189.14	-36.27	141.62	-36.27	146.19	104.37	0.77
4300.00	9.08	101.03	4287.94	-39.52	156.67	-39.52	161.58	104.16	0.56
4400.00	9.55	103.42	4386.62	-42.95	172.49	-42.95	177.75	103.98	0.61
4500.00	8.64	104.90	4485.37	-46.81	187.81	-46.81	193.55	103.99	0.94
4600.00	8.46	99.94	4584.26	-50.01	202.31	-50.01	208.40	103.88	0.76
4700.00	8.67	104.17	4683.14	-53.12	216.87	-53.12	223.28	103.76	0.66
4800.00	8.20	106.00	4782.06	-56.93	231.03	-56.93	237.94	103.84	0.54
4900.00	8.84	110.56	4880.96	-61.60	245.08	-61.60	252.70	104.11	0.94
5000.00	8.13	114.94	4979.86	-67.28	258.68	-67.28	267.29	104.58	0.96
5100.00	6.03	113.15	5079.10	-72.32	269.93	-72.32	279.45	105.00	2.11
5200.00	4.30	106.73	5178.69	-75.47	278.35	-75.47	288.40	105.17	1.82
5300.00	2.72	111.96	5278.50	-77.44	284.14	-77.44	294.50	105.24	1.62
5400.00	0.69	189.94	5378.45	-78.91	286.24	-78.91	296.91	105.41	2.66
5500.00	0.77	240.90	5478.45	-79.83	285.54	-79.83	296.49	105.62	0.63
5600.00	0.73	225.94	5578.44	-80.60	284.49	-80.60	295.69	105.82	0.20
5700.00	0.57	239.86	5678.43	-81.29	283.61	-81.29	295.03	105.99	0.22
5800.00	0.67	239.41	5778.43	-81.84	282.68	-81.84	294.28	106.15	0.11
5900.00	0.81	263.00	5878.42	-82.23	281.46	-82.23	293.23	106.28	0.33
6000.00	0.73	270.26	5978.41	-82.31	280.12	-82.31	291.97	106.37	0.13
6100.00	0.87	279.79	6078.40	-82.18	278.74	-82.18	290.60	106.43	0.20
6200.00	1.41	297.14	6178.38	-81.49	276.89	-81.49	288.63	106.40	0.63
6300.00	1.41	270.40	6278.35	-80.92	274.57	-80.92	286.24	106.42	0.65
6400.00	1.74	282.11	6378.31	-80.59	271.85	-80.59	283.55	106.51	0.46
6500.00	1.80	275.38	6478.26	-80.12	268.80	-80.12	280.48	106.60	0.22
6600.00	1.74	255.29	6578.22	-80.36	265.76	-80.36	277.64	106.82	0.62
6700.00	1.63	247.22	6678.17	-81.30	262.97	-81.30	275.25	107.18	0.26
6800.00	1.40	259.00	6778.14	-82.08	260.46	-82.08	273.08	107.49	0.39
HORIZONTAL DISPLACEMENT IS 273.08 FEET AT 107.49 DEGREES									