

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy

Lease/Well: Leonard / 21-1614

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: 4/29/2011 / 10:17

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	0.82	305.61	100.00	0.42	-0.58	0.42	0.72	305.61	0.82
200.00	0.41	306.35	199.99	1.05	-1.45	1.05	1.79	305.75	0.41
300.00	0.33	303.43	299.99	1.42	-1.98	1.42	2.43	305.57	0.09
400.00	0.25	300.70	399.99	1.69	-2.41	1.69	2.94	305.00	0.07
500.00	0.56	309.23	499.98	2.11	-2.97	2.11	3.64	305.30	0.31
600.00	0.41	320.96	599.98	2.69	-3.57	2.69	4.47	306.95	0.18
700.00	0.62	317.38	699.98	3.36	-4.16	3.36	5.35	308.91	0.21
800.00	0.47	311.13	799.97	4.02	-4.83	4.02	6.29	309.78	0.16
900.00	0.55	312.97	899.97	4.62	-5.49	4.62	7.17	310.07	0.08
1000.00	0.48	288.24	999.96	5.07	-6.23	5.07	8.04	309.14	0.23
1100.00	0.48	282.28	1099.96	5.29	-7.04	5.29	8.80	306.94	0.05
1200.00	0.72	280.28	1199.96	5.49	-8.06	5.49	9.76	304.26	0.24
1300.00	0.65	273.32	1299.95	5.64	-9.24	5.64	10.82	301.38	0.11
1400.00	0.61	234.16	1399.94	5.36	-10.23	5.36	11.55	297.63	0.42
1500.00	0.64	229.55	1499.94	4.68	-11.09	4.68	12.04	292.88	0.06
1600.00	0.74	223.70	1599.93	3.85	-11.96	3.85	12.57	287.84	0.12
1700.00	0.64	218.66	1699.92	2.95	-12.76	2.95	13.09	283.02	0.12
1800.00	0.30	214.63	1799.92	2.30	-13.25	2.30	13.45	279.86	0.34
1900.00	0.18	275.55	1899.92	2.10	-13.55	2.10	13.72	278.82	0.26
2000.00	0.31	343.10	1999.92	2.38	-13.79	2.38	13.99	279.80	0.30
2100.00	0.35	15.16	2099.92	2.94	-13.79	2.94	14.10	282.03	0.19
2200.00	0.26	31.37	2199.91	3.43	-13.59	3.43	14.02	284.15	0.12
2300.00	0.16	7.07	2299.91	3.76	-13.46	3.76	13.97	285.62	0.13
2400.00	0.13	14.78	2399.91	4.01	-13.41	4.01	14.00	286.65	0.04
2500.00	0.31	87.58	2499.91	4.13	-13.11	4.13	13.75	287.47	0.30
2600.00	0.28	82.12	2599.91	4.17	-12.60	4.17	13.28	288.31	0.04
2700.00	0.24	65.49	2699.91	4.29	-12.17	4.29	12.91	289.42	0.09
2800.00	0.32	36.59	2799.91	4.60	-11.82	4.60	12.68	291.28	0.16
2900.00	0.26	47.12	2899.91	4.98	-11.49	4.98	12.52	293.43	0.08
3000.00	0.59	66.19	2999.91	5.34	-10.85	5.34	12.09	296.20	0.36
3100.00	0.60	87.61	3099.90	5.57	-9.86	5.57	11.32	299.47	0.22
3200.00	0.35	75.42	3199.90	5.67	-9.04	5.67	10.67	302.07	0.27
3300.00	0.47	86.34	3299.89	5.77	-8.34	5.77	10.14	304.68	0.15
3400.00	0.50	75.09	3399.89	5.91	-7.50	5.91	9.55	308.23	0.10

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	0.21	119.49	3499.89	5.93	-6.91	5.93	9.11	310.63	0.38
3600.00	0.51	189.19	3599.89	5.39	-6.82	5.39	8.70	308.34	0.48
3700.00	0.53	211.27	3699.88	4.55	-7.13	4.55	8.46	302.56	0.20
3800.00	0.62	194.16	3799.88	3.63	-7.51	3.63	8.34	295.84	0.19
3900.00	0.67	197.82	3899.87	2.55	-7.82	2.55	8.22	288.08	0.07
4000.00	0.40	199.15	3999.87	1.67	-8.11	1.67	8.28	281.60	0.28
4100.00	0.56	246.33	4099.86	1.14	-8.68	1.14	8.75	277.49	0.41
4200.00	0.47	255.67	4199.86	0.84	-9.52	0.84	9.56	275.06	0.13
4300.00	0.54	247.42	4299.86	0.56	-10.35	0.56	10.37	273.10	0.11
4400.00	0.86	263.19	4399.85	0.29	-11.53	0.29	11.54	271.44	0.37
4500.00	1.54	261.42	4499.83	0.00	-13.61	0.00	13.61	270.00	0.68
4600.00	2.35	251.62	4599.77	-0.85	-16.88	-0.85	16.90	267.13	0.88
4700.00	2.14	248.88	4699.69	-2.17	-20.57	-2.17	20.68	263.99	0.24
4800.00	2.09	240.38	4799.62	-3.74	-23.89	-3.74	24.19	261.10	0.32
4900.00	1.85	244.53	4899.56	-5.33	-26.93	-5.33	27.46	258.80	0.28
5000.00	1.45	241.47	4999.52	-6.63	-29.50	-6.63	30.23	257.33	0.41
5100.00	1.27	237.01	5099.49	-7.84	-31.54	-7.84	32.50	256.04	0.21
5200.00	1.17	234.28	5199.47	-9.04	-33.29	-9.04	34.50	254.82	0.12
5300.00	1.09	267.52	5299.45	-9.67	-35.07	-9.67	36.38	254.58	0.65
5400.00	0.88	279.22	5399.44	-9.59	-36.78	-9.59	38.01	255.39	0.29
5500.00	0.62	238.06	5499.43	-9.75	-38.00	-9.75	39.23	255.60	0.58
5600.00	0.08	283.98	5599.43	-10.03	-38.52	-10.03	39.81	255.41	0.57
5700.00	0.16	245.04	5699.43	-10.07	-38.71	-10.07	40.00	255.42	0.11
5800.00	0.10	172.49	5799.43	-10.22	-38.83	-10.22	40.15	255.26	0.16
5900.00	0.34	171.89	5899.43	-10.59	-38.78	-10.59	40.20	254.72	0.24
6000.00	0.18	154.86	5999.43	-11.03	-38.67	-11.03	40.21	254.08	0.17
6100.00	0.14	147.61	6099.43	-11.28	-38.53	-11.28	40.15	253.69	0.04
6200.00	0.34	246.04	6199.43	-11.51	-38.74	-11.51	40.41	253.46	0.39
6300.00	0.53	157.89	6299.42	-12.06	-38.83	-12.06	40.66	252.75	0.62
6400.00	0.63	203.61	6399.42	-13.00	-38.88	-13.00	41.00	251.52	0.46
6500.00	0.66	171.88	6499.41	-14.07	-39.02	-14.07	41.48	250.17	0.35
6600.00	0.49	189.94	6599.41	-15.06	-39.01	-15.06	41.82	248.90	0.24
6700.00	0.90	158.39	6699.40	-16.21	-38.80	-16.21	42.05	247.33	0.55
6800.00	0.87	145.36	6799.39	-17.56	-38.08	-17.56	41.93	245.25	0.20
HORIZONTAL DISPLACEMENT IS 41.93 FEET AT 245.25 DEGREES									