

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy
 Lease/Well: Ocoma B / 31-16
 Location: S-31 T-5N R-64W
 Rig Name: Production
 State/County: Colorado / Weld County
 Latitude: 40.35, Longitude: -104.58
 GRID North is 0.59 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: 5/11/2011 / 17:01

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	0.61	326.32	100.00	0.45	-0.30	0.45	0.54	326.32	0.61
200.00	0.41	305.27	199.99	1.10	-0.89	1.10	1.41	321.09	0.27
300.00	0.27	287.99	299.99	1.38	-1.40	1.38	1.97	314.50	0.17
400.00	0.21	217.76	399.99	1.31	-1.74	1.31	2.17	307.01	0.28
500.00	0.31	104.64	499.99	1.10	-1.59	1.10	1.93	304.70	0.43
600.00	0.22	106.50	599.99	0.98	-1.14	0.98	1.50	310.53	0.08
700.00	0.20	118.96	699.99	0.84	-0.80	0.84	1.16	316.19	0.05
800.00	0.21	115.61	799.99	0.67	-0.49	0.67	0.83	324.12	0.01
900.00	0.26	248.56	899.99	0.51	-0.54	0.51	0.74	313.48	0.43
1000.00	0.29	199.61	999.99	0.19	-0.84	0.19	0.86	282.63	0.23
1100.00	0.36	180.04	1099.99	-0.37	-0.93	-0.37	1.00	248.36	0.13
1200.00	0.20	177.69	1199.98	-0.86	-0.92	-0.86	1.26	226.92	0.16
1300.00	0.26	211.61	1299.98	-1.23	-1.03	-1.23	1.60	220.00	0.15
1400.00	0.30	184.78	1399.98	-1.69	-1.17	-1.69	2.05	214.81	0.14
1500.00	0.20	234.62	1499.98	-2.05	-1.34	-2.05	2.45	213.09	0.23
1600.00	0.27	248.85	1599.98	-2.24	-1.70	-2.24	2.81	217.21	0.09
1700.00	0.14	250.83	1699.98	-2.36	-2.04	-2.36	3.12	220.77	0.13
1800.00	0.26	217.01	1799.98	-2.59	-2.29	-2.59	3.46	221.56	0.16
1900.00	0.34	168.79	1899.98	-3.05	-2.37	-3.05	3.87	217.83	0.25
2000.00	0.22	186.43	1999.98	-3.53	-2.34	-3.53	4.23	213.49	0.14
2100.00	0.37	132.83	2099.98	-3.94	-2.12	-3.94	4.48	208.27	0.30
2200.00	0.59	123.29	2199.97	-4.45	-1.45	-4.45	4.68	198.08	0.23
2300.00	0.45	179.31	2299.97	-5.12	-1.02	-5.12	5.22	191.22	0.50
2400.00	0.54	127.97	2399.97	-5.80	-0.64	-5.80	5.84	186.31	0.43
2500.00	0.65	153.08	2499.96	-6.60	-0.02	-6.60	6.60	180.15	0.28
2600.00	0.66	136.10	2599.95	-7.51	0.64	-7.51	7.54	175.15	0.19
2700.00	0.65	148.15	2699.95	-8.41	1.34	-8.41	8.52	170.98	0.14
2800.00	0.55	86.96	2799.94	-8.86	2.11	-8.86	9.11	166.62	0.61
2900.00	0.59	123.08	2899.94	-9.12	3.01	-9.12	9.60	161.72	0.35
3000.00	0.99	107.34	2999.93	-9.66	4.27	-9.66	10.56	156.16	0.46
3100.00	0.59	99.46	3099.92	-10.00	5.60	-10.00	11.46	150.75	0.42
3200.00	0.35	229.69	3199.92	-10.28	5.87	-10.28	11.84	150.25	0.85
3300.00	0.78	230.91	3299.91	-10.90	5.11	-10.90	12.04	154.87	0.44
3400.00	0.95	236.02	3399.90	-11.79	3.90	-11.79	12.42	161.71	0.18

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	1.02	243.21	3499.89	-12.66	2.42	-12.66	12.89	169.19	0.14
3600.00	1.62	246.03	3599.86	-13.63	0.33	-13.63	13.64	178.62	0.60
3700.00	1.83	250.50	3699.81	-14.74	-2.47	-14.74	14.95	189.51	0.25
3800.00	1.81	255.42	3799.76	-15.67	-5.51	-15.67	16.61	199.36	0.16
3900.00	1.69	248.51	3899.72	-16.61	-8.41	-16.61	18.62	206.85	0.25
4000.00	1.38	246.14	3999.68	-17.64	-10.88	-17.64	20.72	211.67	0.31
4100.00	1.02	237.65	4099.66	-18.60	-12.74	-18.60	22.54	214.40	0.40
4200.00	1.10	241.02	4199.64	-19.54	-14.33	-19.54	24.23	216.25	0.10
4300.00	1.03	245.54	4299.62	-20.38	-15.98	-20.38	25.90	218.10	0.11
4400.00	1.02	238.54	4399.61	-21.21	-17.56	-21.21	27.54	219.61	0.12
4500.00	0.84	251.48	4499.60	-21.91	-19.01	-21.91	29.01	220.94	0.28
4600.00	0.72	269.12	4599.59	-22.15	-20.33	-22.15	30.06	222.54	0.27
4700.00	0.70	276.70	4699.58	-22.09	-21.56	-22.09	30.86	224.30	0.10
4800.00	0.64	278.14	4799.57	-21.94	-22.71	-21.94	31.58	225.99	0.06
4900.00	0.24	271.82	4899.57	-21.86	-23.47	-21.86	32.07	227.04	0.40
5000.00	0.19	274.35	4999.57	-21.84	-23.85	-21.84	32.33	227.52	0.05
5100.00	0.11	337.41	5099.57	-21.74	-24.05	-21.74	32.42	227.89	0.17
5200.00	0.21	54.57	5199.57	-21.54	-23.93	-21.54	32.20	228.01	0.22
5300.00	0.15	42.04	5299.57	-21.33	-23.69	-21.33	31.88	228.00	0.07
5400.00	0.39	147.69	5399.57	-21.52	-23.42	-21.52	31.81	227.42	0.45
5500.00	0.35	129.20	5499.56	-22.00	-23.01	-22.00	31.83	226.29	0.12
5600.00	0.29	118.60	5599.56	-22.31	-22.55	-22.31	31.72	225.31	0.08
5700.00	0.25	52.29	5699.56	-22.30	-22.15	-22.30	31.43	224.82	0.30
5800.00	0.20	216.74	5799.56	-22.30	-22.08	-22.30	31.39	224.72	0.44
5900.00	0.16	28.20	5899.56	-22.32	-22.12	-22.32	31.43	224.75	0.35
6000.00	0.39	24.45	5999.56	-21.89	-21.92	-21.89	30.98	225.03	0.23
6100.00	0.96	60.16	6099.55	-21.17	-21.05	-21.17	29.86	224.84	0.69
6200.00	0.91	77.25	6199.54	-20.58	-19.55	-20.58	28.38	223.53	0.28
6300.00	0.95	75.02	6299.53	-20.19	-17.97	-20.19	27.03	221.68	0.05
6400.00	1.03	65.10	6399.51	-19.59	-16.36	-19.59	25.52	219.86	0.19
6500.00	1.10	45.57	6499.50	-18.54	-14.86	-18.54	23.76	218.70	0.37
6600.00	1.24	36.11	6599.47	-17.00	-13.53	-17.00	21.73	218.53	0.24
6700.00	1.23	25.87	6699.45	-15.16	-12.43	-15.16	19.60	219.35	0.22
6800.00	1.05	45.76	6799.43	-13.55	-11.30	-13.55	17.65	219.83	0.43
6900.00	0.92	57.73	6899.42	-12.48	-9.97	-12.48	15.97	218.60	0.24

HORIZONTAL DISPLACEMENT IS
15.97 FEET AT 218.60 DEGREES