



Company: NOBLE  
 Lease/Well: HARLESS/# 17-1  
 Location:  
 Rig Name: PRODUCTION  
 State/County: COLORADO/WELD COUNTY  
 Latitude: 40.32  
 GRID North is 0.60 Degrees East of True North  
 VS-Azi: 0.00 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : GL

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: run1-01.ut  
 Minimum Curvature Method  
 Report Date/Time: 3/16/2011 / 12:55

Vaughn Energy Services  
 Rifle, Colorado  
 970-456-2071  
 Garry Fowler  
 Harless 17-1/05-123-12441

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	0.51	14.63	100.00	0.43	0.11	0.43	0.44	14.63	0.51
200.00	0.48	14.63	200.00	1.26	0.33	1.26	1.30	14.63	0.03
300.00	0.43	15.50	299.99	2.02	0.53	2.02	2.09	14.79	0.05
400.00	0.42	15.77	399.99	2.74	0.73	2.74	2.84	15.01	0.01
500.00	0.45	18.36	499.99	3.47	0.96	3.47	3.60	15.45	0.03
600.00	0.42	23.76	599.98	4.17	1.23	4.17	4.35	16.41	0.05
700.00	0.38	40.96	699.98	4.75	1.59	4.75	5.01	18.50	0.13
800.00	0.18	77.57	799.98	5.04	1.96	5.04	5.40	21.27	0.26
900.00	0.10	78.48	899.98	5.09	2.20	5.09	5.54	23.38	0.08
1000.00	0.23	80.91	999.98	5.14	2.48	5.14	5.71	25.81	0.13
1100.00	0.23	78.56	1099.98	5.21	2.88	5.21	5.95	28.95	0.01
1200.00	0.34	312.43	1199.98	5.45	2.86	5.45	6.15	27.68	0.51
1300.00	0.43	310.32	1299.98	5.89	2.35	5.89	6.35	21.75	0.09
1400.00	0.51	315.37	1399.97	6.46	1.75	6.46	6.69	15.18	0.09
1500.00	0.73	313.71	1499.97	7.21	0.98	7.21	7.28	7.74	0.22
1600.00	0.76	318.54	1599.96	8.14	0.09	8.14	8.14	0.60	0.07
1700.00	0.81	317.01	1699.95	9.15	-0.83	9.15	9.19	354.80	0.06
1800.00	0.50	314.66	1799.94	9.97	-1.62	9.97	10.11	350.77	0.31
1900.00	0.31	293.51	1899.94	10.39	-2.18	10.39	10.61	348.15	0.24
2000.00	0.29	172.65	1999.94	10.25	-2.39	10.25	10.52	346.84	0.52
2100.00	0.28	167.24	2099.94	9.76	-2.31	9.76	10.03	346.69	0.03
2200.00	0.28	146.49	2199.94	9.32	-2.12	9.32	9.56	347.19	0.10
2300.00	0.30	140.27	2299.93	8.91	-1.82	8.91	9.09	348.48	0.03
2400.00	0.33	119.84	2399.93	8.57	-1.40	8.57	8.68	350.71	0.12
2500.00	0.36	99.54	2499.93	8.37	-0.84	8.37	8.41	354.28	0.13
2600.00	0.36	93.42	2599.93	8.30	-0.21	8.30	8.30	358.52	0.04
2700.00	0.34	91.56	2699.93	8.27	0.39	8.27	8.28	2.72	0.02
2800.00	0.33	73.71	2799.93	8.35	0.97	8.35	8.40	6.60	0.10
2900.00	0.32	64.49	2899.92	8.55	1.49	8.55	8.68	9.90	0.05
3000.00	0.34	62.65	2999.92	8.80	2.01	8.80	9.03	12.84	0.03
3100.00	0.35	60.82	3099.92	9.09	2.54	9.09	9.44	15.59	0.01

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
3200.00	0.41	51.98	3199.92	9.46	3.08	9.46	9.95	18.05	0.08
3300.00	0.46	42.79	3299.92	9.97	3.64	9.97	10.61	20.04	0.09
3400.00	0.36	130.27	3399.91	10.07	4.15	10.07	10.89	22.42	0.57
3500.00	0.21	148.91	3499.91	9.70	4.49	9.70	10.69	24.82	0.17
3600.00	0.61	158.00	3599.91	9.05	4.78	9.05	10.24	27.86	0.41
3700.00	0.64	160.40	3699.90	8.02	5.17	8.02	9.55	32.81	0.04
3800.00	0.71	166.84	3799.90	6.89	5.50	6.89	8.82	38.62	0.10
3900.00	0.68	160.04	3899.89	5.72	5.85	5.72	8.18	45.62	0.09
4000.00	0.49	154.72	3999.88	4.78	6.23	4.78	7.85	52.53	0.21
4100.00	0.49	152.23	4099.88	4.02	6.61	4.02	7.74	58.73	0.02
4200.00	0.48	153.18	4199.88	3.26	7.00	3.26	7.72	65.02	0.01
4300.00	0.47	152.71	4299.87	2.52	7.38	2.52	7.80	71.13	0.01
4400.00	0.45	98.52	4399.87	2.10	7.96	2.10	8.23	75.21	0.42
4500.00	0.45	77.29	4499.87	2.13	8.73	2.13	8.98	76.29	0.17
4600.00	0.50	69.24	4599.86	2.37	9.52	2.37	9.81	76.02	0.08
4700.00	0.69	67.87	4699.86	2.75	10.48	2.75	10.84	75.30	0.19
4800.00	0.87	65.66	4799.85	3.29	11.73	3.29	12.19	74.33	0.19
4900.00	0.55	62.84	4899.84	3.82	12.86	3.82	13.41	73.43	0.33
5000.00	0.42	57.77	4999.84	4.24	13.59	4.24	14.24	72.68	0.13
5100.00	0.33	69.21	5099.84	4.54	14.18	4.54	14.88	72.25	0.12
5200.00	0.21	64.47	5199.84	4.72	14.61	4.72	15.36	72.09	0.12
5300.00	0.39	63.21	5299.83	4.96	15.09	4.96	15.88	71.81	0.18
5400.00	0.39	61.43	5399.83	5.27	15.69	5.27	16.55	71.43	0.01
5500.00	0.44	62.67	5499.83	5.61	16.33	5.61	17.26	71.04	0.06
5600.00	0.47	78.67	5599.83	5.87	17.07	5.87	18.05	71.04	0.13
5700.00	0.50	112.47	5699.82	5.78	17.89	5.78	18.80	72.09	0.29
5800.00	0.51	146.29	5799.82	5.24	18.54	5.24	19.27	74.21	0.30
5900.00	0.58	151.86	5899.81	4.42	19.03	4.42	19.53	76.91	0.09
6000.00	0.61	130.88	5999.81	3.62	19.67	3.62	20.00	79.56	0.22
6100.00	0.78	90.24	6099.80	3.27	20.76	3.27	21.01	81.04	0.51
6200.00	0.81	89.91	6199.79	3.27	22.15	3.27	22.39	81.60	0.03
6300.00	0.89	102.02	6299.78	3.11	23.62	3.11	23.83	82.50	0.20
6400.00	0.98	114.93	6399.77	2.59	25.16	2.59	25.29	84.13	0.23
6500.00	1.11	129.50	6499.75	1.61	26.69	1.61	26.73	86.55	0.30
6600.00	1.11	140.74	6599.73	0.24	28.05	0.24	28.05	89.51	0.22
6700.00	1.51	159.40	6699.71	-1.74	29.12	-1.74	29.18	93.42	0.58
6800.00	1.76	184.66	6799.67	-4.50	29.46	-4.50	29.80	98.69	0.75
6870.00	2.10	190.19	6869.63	-6.83	29.15	-6.83	29.94	103.19	0.55

HORIZONTAL DISPLACEMENT IS

29.94 FEET AT 103.19 DEGREES