

**VES**

VAUGHN ENERGY SERVICES

Company: Noble

Lease/Well: Hagen/9-9

Location:

Rig Name: Production

State/County: Colorado/Weld County

Latitude: 40.32

GRID North is 0.62 Degrees East of True North

VS-Azi: 0.00 Degrees

**GTI**

GYRO TECHNOLOGIES, INC

## FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : GL

## DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: run1-01.ut

Minimum Curvature Method

Report Date/Time: 3/24/2011 / 19:56

Vaughn Energy Services

Rifle, Colorado

970-456-2071

Garry Fowler

Hagen 9-9/05-123-17123

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	0.90	238.83	100.00	-0.41	-0.67	-0.41	0.78	238.83	0.90
200.00	0.85	236.01	199.98	-1.23	-1.96	-1.23	2.31	237.92	0.06
300.00	0.32	229.97	299.98	-1.82	-2.79	-1.82	3.33	236.82	0.53
400.00	0.31	204.50	399.98	-2.25	-3.12	-2.25	3.85	234.16	0.14
500.00	0.45	177.29	499.98	-2.89	-3.21	-2.89	4.32	228.00	0.22
600.00	0.38	187.90	599.97	-3.61	-3.24	-3.61	4.85	221.87	0.10
700.00	0.30	204.58	699.97	-4.18	-3.39	-4.18	5.38	219.08	0.13
800.00	0.24	200.20	799.97	-4.61	-3.57	-4.61	5.83	217.76	0.06
900.00	0.25	199.16	899.97	-5.02	-3.72	-5.02	6.25	216.53	0.01
1000.00	0.20	191.68	999.97	-5.41	-3.83	-5.41	6.62	215.31	0.06
1100.00	0.23	191.90	1099.97	-5.78	-3.91	-5.78	6.97	214.06	0.03
1200.00	0.27	161.06	1199.97	-6.20	-3.87	-6.20	7.31	211.96	0.14
1300.00	0.22	144.42	1299.97	-6.59	-3.68	-6.59	7.54	209.18	0.09
1400.00	0.28	102.47	1399.96	-6.80	-3.33	-6.80	7.57	206.09	0.19
1500.00	0.29	104.21	1499.96	-6.91	-2.85	-6.91	7.47	202.38	0.01
1600.00	0.30	101.58	1599.96	-7.03	-2.35	-7.03	7.41	198.49	0.01
1700.00	0.35	101.05	1699.96	-7.14	-1.80	-7.14	7.36	194.13	0.06
1800.00	0.28	108.29	1799.96	-7.27	-1.26	-7.27	7.38	189.86	0.08
1900.00	0.10	240.15	1899.96	-7.39	-1.11	-7.39	7.48	188.53	0.36
2000.00	0.34	250.40	1999.96	-7.54	-1.46	-7.54	7.68	190.99	0.24
2100.00	0.11	281.31	2099.96	-7.61	-1.84	-7.61	7.83	193.57	0.25
2200.00	0.37	314.90	2199.96	-7.37	-2.16	-7.37	7.68	196.35	0.28
2300.00	0.68	301.31	2299.95	-6.84	-2.89	-6.84	7.42	202.94	0.34
2400.00	1.31	277.30	2399.94	-6.38	-4.53	-6.38	7.83	215.39	0.74
2500.00	1.31	263.98	2499.91	-6.36	-6.80	-6.36	9.31	226.94	0.30
2600.00	1.27	265.22	2599.89	-6.57	-9.04	-6.57	11.17	233.99	0.05
2700.00	1.08	286.31	2699.86	-6.40	-11.05	-6.40	12.77	239.93	0.47
2800.00	0.90	289.08	2799.85	-5.88	-12.69	-5.88	13.98	245.15	0.19
2900.00	0.80	287.73	2899.84	-5.41	-14.09	-5.41	15.10	249.01	0.10
3000.00	0.70	271.14	2999.83	-5.18	-15.37	-5.18	16.22	251.37	0.24
3100.00	0.83	278.80	3099.82	-5.06	-16.70	-5.06	17.45	253.14	0.16

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	1.23	284.38	3199.81	-4.68	-18.45	-4.68	19.04	255.76	0.41
3300.00	1.46	288.89	3299.78	-4.01	-20.69	-4.01	21.08	259.04	0.25
3400.00	1.57	313.97	3399.74	-2.64	-22.88	-2.64	23.04	263.42	0.67
3500.00	1.29	313.77	3499.71	-0.91	-24.69	-0.91	24.70	267.89	0.28
3600.00	1.24	302.08	3599.69	0.45	-26.42	0.45	26.42	270.97	0.26
3700.00	1.37	310.51	3699.66	1.80	-28.24	1.80	28.30	273.64	0.23
3800.00	1.39	302.51	3799.63	3.22	-30.17	3.22	30.34	276.10	0.19
3900.00	1.58	301.23	3899.60	4.59	-32.37	4.59	32.70	278.07	0.20
4000.00	2.25	300.32	3999.54	6.30	-35.25	6.30	35.81	280.13	0.67
4100.00	3.14	309.05	4099.43	9.02	-39.08	9.02	40.11	283.00	0.98
4200.00	2.90	303.28	4199.29	12.13	-43.32	12.13	44.99	285.65	0.39
4300.00	2.88	311.09	4299.17	15.17	-47.32	15.17	49.70	287.77	0.39
4400.00	2.90	307.19	4399.04	18.35	-51.23	18.35	54.42	289.70	0.20
4500.00	3.14	300.06	4498.90	21.25	-55.62	21.25	59.54	290.91	0.45
4600.00	3.76	308.41	4598.72	24.66	-60.56	24.66	65.39	292.15	0.79
4700.00	2.85	305.59	4698.55	28.14	-65.15	28.14	70.97	293.36	0.92
4800.00	2.05	310.13	4798.46	30.74	-68.54	30.74	75.12	294.16	0.82
4900.00	1.57	310.94	4898.41	32.80	-70.95	32.80	78.16	294.81	0.48
5000.00	1.50	300.07	4998.37	34.35	-73.11	34.35	80.78	295.16	0.30
5100.00	1.26	302.29	5098.35	35.59	-75.18	35.59	83.18	295.34	0.25
5200.00	1.23	287.12	5198.32	36.50	-77.13	36.50	85.33	295.32	0.33
5300.00	1.42	274.08	5298.30	36.90	-79.40	36.90	87.55	294.93	0.35
5400.00	2.21	269.54	5398.24	36.97	-82.56	36.97	90.46	294.13	0.80
5500.00	2.65	273.05	5498.15	37.08	-86.79	37.08	94.38	293.13	0.46
5600.00	2.43	281.78	5598.06	37.64	-91.18	37.64	98.64	292.43	0.44
5700.00	1.81	291.89	5697.99	38.66	-94.72	38.66	102.30	292.20	0.73
5800.00	1.73	294.73	5797.94	39.88	-97.56	39.88	105.39	292.23	0.11
5900.00	2.04	311.08	5897.89	41.68	-100.27	41.68	108.59	292.57	0.61
6000.00	2.37	315.19	5997.81	44.31	-103.07	44.31	112.19	293.27	0.37
6100.00	2.61	310.50	6097.72	47.26	-106.26	47.26	116.29	293.98	0.32
6200.00	2.92	315.20	6197.60	50.55	-109.78	50.55	120.86	294.72	0.38
6300.00	3.56	309.45	6297.44	54.32	-113.97	54.32	126.25	295.48	0.72
6400.00	4.03	307.76	6397.22	58.45	-119.14	58.45	132.71	296.13	0.49
6500.00	4.54	310.45	6496.94	63.17	-124.94	63.17	140.00	296.82	0.55
6600.00	4.51	313.10	6596.63	68.43	-130.83	68.43	147.64	297.61	0.21
6700.00	4.53	318.47	6696.32	74.07	-136.32	74.07	155.14	298.52	0.42
6800.00	5.10	316.25	6795.97	80.24	-142.01	80.24	163.11	299.47	0.60

<div> HORIZONTAL DISPLACEMENT IS  163.11 FEET AT 299.47 DEGREES </div>
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