

**VES**

VAUGHN ENERGY SERVICES

Company: Noble  
Lease/Well: Gutteresen State D/16-24

Location:

Rig Name: Production  
State/County: Colorado/Weld County

Latitude: 40.22

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 : GL

## DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: run1-01\_ed.ut

Minimum Curvature Method

Report Date/Time: 3/25/2011 / 12:54

Vaughn Energy Services

Rifle, Colorado

970-456-2071

Garry Fowler

Gutteresen State D 16-24

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	0.25	37.63	100.00	0.17	0.13	0.17	0.21	37.63	0.25
200.00	0.27	38.62	200.00	0.52	0.41	0.52	0.67	37.98	0.03
300.00	0.30	33.99	300.00	0.93	0.70	0.93	1.17	37.21	0.04
400.00	0.44	26.96	400.00	1.48	1.02	1.48	1.80	34.59	0.14
500.00	0.85	27.95	499.99	2.48	1.54	2.48	2.92	31.92	0.41
600.00	1.20	22.36	599.97	4.10	2.29	4.10	4.70	29.17	0.37
700.00	1.52	8.15	699.94	6.39	2.88	6.39	7.00	24.24	0.46
800.00	1.75	9.55	799.90	9.21	3.32	9.21	9.79	19.81	0.24
900.00	1.86	9.74	899.85	12.32	3.85	12.32	12.91	17.34	0.11
1000.00	2.23	8.80	999.79	15.85	4.42	15.85	16.46	15.58	0.37
1100.00	2.62	9.74	1099.70	20.03	5.11	20.03	20.67	14.30	0.39
1200.00	2.55	9.62	1199.60	24.48	5.86	24.48	25.17	13.47	0.07
1300.00	2.26	10.69	1299.51	28.60	6.60	28.60	29.35	12.99	0.29
1400.00	2.22	6.19	1399.43	32.46	7.17	32.46	33.25	12.46	0.18
1500.00	2.21	4.96	1499.36	36.31	7.55	36.31	37.09	11.74	0.05
1600.00	1.91	3.61	1599.29	39.90	7.82	39.90	40.66	11.09	0.30
1700.00	2.22	340.23	1699.23	43.39	7.27	43.39	43.99	9.51	0.89
1800.00	2.22	339.79	1799.16	47.02	5.95	47.02	47.40	7.21	0.02
1900.00	1.77	338.68	1899.10	50.28	4.72	50.28	50.50	5.36	0.45
2000.00	1.33	339.74	1999.06	52.80	3.76	52.80	52.94	4.07	0.44
2100.00	0.97	324.13	2099.04	54.58	2.86	54.58	54.65	3.00	0.47
2200.00	0.70	326.61	2199.03	55.77	2.03	55.77	55.81	2.08	0.27
2300.00	0.70	325.76	2299.02	56.78	1.35	56.78	56.80	1.36	0.01
2400.00	0.32	339.32	2399.02	57.55	0.91	57.55	57.56	0.90	0.40
2500.00	0.18	354.87	2499.02	57.97	0.80	57.97	57.97	0.79	0.15
2600.00	0.18	354.85	2599.01	58.29	0.77	58.29	58.29	0.75	0.00
2700.00	0.30	351.51	2699.01	58.70	0.71	58.70	58.71	0.70	0.12
2800.00	0.34	358.58	2799.01	59.26	0.67	59.26	59.27	0.65	0.06
2900.00	0.60	352.38	2899.01	60.08	0.59	60.08	60.09	0.56	0.27
3000.00	0.68	340.22	2999.00	61.17	0.32	61.17	61.17	0.30	0.16
3100.00	0.67	333.86	3099.00	62.25	-0.14	62.25	62.25	359.87	0.08

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	0.56	295.93	3198.99	62.99	-0.84	62.99	63.00	359.24	0.41
3300.00	0.59	241.38	3298.99	62.96	-1.73	62.96	62.99	358.42	0.53
3400.00	0.99	169.71	3398.98	61.86	-2.03	61.86	61.90	358.12	0.98
3500.00	1.60	139.41	3498.95	59.95	-0.97	59.95	59.96	359.07	0.90
3600.00	1.94	109.86	3598.91	58.32	1.53	58.32	58.34	1.50	0.96
3700.00	2.43	96.62	3698.83	57.50	5.23	57.50	57.74	5.19	0.70
3800.00	2.56	78.71	3798.74	57.69	9.52	57.69	58.47	9.37	0.79
3900.00	2.93	64.80	3898.63	59.22	14.02	59.22	60.85	13.32	0.76
4000.00	2.95	80.09	3998.50	60.75	18.87	60.75	63.61	17.26	0.78
4100.00	3.23	84.63	4098.35	61.45	24.21	61.45	66.05	21.50	0.37
4200.00	3.29	80.76	4198.19	62.18	29.85	62.18	68.97	25.64	0.23
4300.00	3.41	74.45	4298.02	63.44	35.55	63.44	72.72	29.27	0.39
4400.00	3.54	71.31	4397.84	65.22	41.33	65.22	77.22	32.36	0.23
4500.00	3.71	72.53	4497.64	67.18	47.34	67.18	82.18	35.17	0.19
4600.00	4.12	72.65	4597.40	69.22	53.85	69.22	87.70	37.88	0.41
4700.00	3.24	69.59	4697.20	71.28	59.92	71.28	93.12	40.05	0.90
4800.00	2.68	55.78	4797.06	73.58	64.50	73.58	97.85	41.24	0.90
4900.00	1.76	47.99	4896.99	75.92	67.58	75.92	101.64	41.67	0.96
5000.00	1.05	32.36	4996.96	77.72	69.21	77.72	104.06	41.68	0.80
5100.00	0.84	30.07	5096.94	79.12	70.06	79.12	105.68	41.52	0.21
5200.00	0.82	30.79	5196.93	80.38	70.80	80.38	107.11	41.37	0.02
5300.00	0.53	51.30	5296.93	81.28	71.52	81.28	108.27	41.35	0.38
5400.00	0.84	65.37	5396.92	81.87	72.55	81.87	109.39	41.54	0.36
5500.00	0.86	92.10	5496.91	82.15	73.97	82.15	110.55	42.00	0.40
5600.00	1.08	86.11	5596.89	82.19	75.67	82.19	111.72	42.63	0.24
5700.00	1.13	88.77	5696.88	82.27	77.59	82.27	113.09	43.32	0.07
5800.00	0.89	94.72	5796.86	82.23	79.34	82.23	114.27	43.98	0.26
5900.00	0.80	111.70	5896.85	81.91	80.76	81.91	115.03	44.60	0.26
6000.00	0.65	104.92	5996.84	81.51	81.96	81.51	115.59	45.16	0.17
6100.00	0.25	103.61	6096.84	81.31	82.71	81.31	115.99	45.49	0.40
6200.00	0.30	104.82	6196.84	81.19	83.17	81.19	116.23	45.69	0.05
6300.00	0.33	139.16	6296.84	80.91	83.62	80.91	116.35	45.94	0.19
6400.00	0.40	141.52	6396.83	80.41	84.02	80.41	116.30	46.26	0.07
6500.00	0.50	148.12	6496.83	79.78	84.47	79.78	116.18	46.64	0.11
6600.00	0.45	139.59	6596.83	79.11	84.95	79.11	116.08	47.04	0.09
6700.00	0.47	126.44	6696.82	78.57	85.53	78.57	116.14	47.43	0.11
6800.00	0.48	122.50	6796.82	78.09	86.22	78.09	116.33	47.83	0.04
6900.00	0.39	126.05	6896.82	77.67	86.85	77.67	116.51	48.20	0.10
7000.00	0.32	148.52	6996.82	77.23	87.28	77.23	116.54	48.50	0.16
7100.00	0.12	149.32	7096.82	76.90	87.47	76.90	116.47	48.68	0.20
7200.00	0.22	157.77	7196.82	76.63	87.60	76.63	116.39	48.82	0.11
7300.00	0.42	126.01	7296.81	76.24	87.97	76.24	116.41	49.09	0.26
7400.00	0.49	123.69	7396.81	75.78	88.63	75.78	116.61	49.47	0.07

HORIZONTAL DISPLACEMENT IS  
116.61 FEET AT 49.47 DEGREES