

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy

Lease/Well: Spike State / D16-9

Location: S-16 T-3N R-65W

Rig Name: Production

State/County: Colorado / Weld County

Latitude: 40.22, 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 : Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: inrun_ed.ut

Minimum Curvature Method

Report Date/Time: 12/18/2010 / 12:14

Vaughn Energy Services

Fort Worth, Texas

817-741-3610

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	0.28	7.26	100.00	0.24	0.03	0.24	0.24	7.26	0.28
200.00	0.25	276.07	200.00	0.50	-0.15	0.50	0.53	343.01	0.38
300.00	0.27	285.90	300.00	0.59	-0.60	0.59	0.84	314.71	0.05
400.00	0.38	322.06	400.00	0.92	-1.03	0.92	1.38	311.75	0.23
500.00	0.32	263.85	499.99	1.16	-1.51	1.16	1.90	307.39	0.35
600.00	0.34	260.21	599.99	1.07	-2.08	1.07	2.34	297.33	0.03
700.00	0.40	249.11	699.99	0.90	-2.70	0.90	2.85	288.42	0.09
800.00	0.35	309.29	799.99	0.97	-3.26	0.97	3.40	286.50	0.38
900.00	0.42	304.75	899.99	1.37	-3.79	1.37	4.03	289.80	0.08
1000.00	0.49	294.88	999.98	1.76	-4.49	1.76	4.82	291.38	0.11
1100.00	0.60	326.08	1099.98	2.38	-5.17	2.38	5.69	294.67	0.31
1200.00	0.61	322.95	1199.97	3.24	-5.79	3.24	6.63	299.23	0.03
1300.00	0.61	289.07	1299.97	3.84	-6.61	3.84	7.64	300.14	0.35
1400.00	0.55	291.94	1399.96	4.19	-7.55	4.19	8.64	299.01	0.06
1500.00	0.63	312.32	1499.96	4.73	-8.40	4.73	9.64	299.41	0.22
1600.00	0.63	291.60	1599.95	5.30	-9.31	5.30	10.72	299.66	0.23
1700.00	0.44	321.18	1699.95	5.81	-10.07	5.81	11.62	299.98	0.33
1800.00	0.33	320.51	1799.95	6.33	-10.50	6.33	12.26	301.11	0.11
1900.00	0.05	255.71	1899.95	6.55	-10.73	6.55	12.57	301.40	0.31
2000.00	0.10	210.48	1999.95	6.46	-10.81	6.46	12.60	300.87	0.07
2100.00	0.17	128.57	2099.94	6.30	-10.74	6.30	12.46	300.39	0.18
2200.00	0.16	40.07	2199.94	6.32	-10.54	6.32	12.29	300.93	0.23
2300.00	0.14	173.53	2299.94	6.30	-10.44	6.30	12.19	301.11	0.27
2400.00	0.10	211.45	2399.94	6.10	-10.47	6.10	12.12	300.24	0.09
2500.00	0.29	213.04	2499.94	5.82	-10.65	5.82	12.14	298.67	0.19
2600.00	0.39	36.45	2599.94	5.89	-10.58	5.89	12.11	299.09	0.68
2700.00	0.28	178.12	2699.94	5.92	-10.37	5.92	11.95	299.72	0.63
2800.00	0.32	165.92	2799.94	5.41	-10.30	5.41	11.63	297.72	0.08
2900.00	0.33	155.53	2899.94	4.88	-10.11	4.88	11.23	295.76	0.06
3000.00	0.32	161.04	2999.94	4.36	-9.90	4.36	10.82	293.75	0.03
3100.00	0.42	151.84	3099.94	3.78	-9.64	3.78	10.36	291.39	0.12
3200.00	1.00	120.90	3199.93	3.01	-8.73	3.01	9.23	289.03	0.67
3300.00	1.08	130.49	3299.91	1.95	-7.26	1.95	7.52	285.03	0.19
3400.00	1.11	131.45	3399.89	0.70	-5.82	0.70	5.86	276.82	0.03

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	1.20	140.43	3499.87	-0.75	-4.42	-0.75	4.49	260.34	0.20
3600.00	0.97	147.92	3599.86	-2.28	-3.30	-2.28	4.01	235.39	0.27
3700.00	0.85	157.03	3699.84	-3.68	-2.57	-3.68	4.49	214.89	0.19
3800.00	0.80	136.88	3799.83	-4.87	-1.80	-4.87	5.19	200.28	0.29
3900.00	0.88	125.11	3899.82	-5.82	-0.70	-5.82	5.86	186.83	0.19
4000.00	1.33	120.48	3999.80	-6.85	0.93	-6.85	6.91	172.29	0.46
4100.00	1.57	109.37	4099.77	-7.89	3.22	-7.89	8.52	157.79	0.37
4200.00	1.50	145.54	4199.74	-9.42	5.26	-9.42	10.79	150.84	0.96
4300.00	1.61	161.14	4299.70	-11.84	6.45	-11.84	13.48	151.40	0.44
4400.00	1.63	162.53	4399.66	-14.53	7.34	-14.53	16.28	153.21	0.04
4500.00	1.69	135.81	4499.62	-16.94	8.79	-16.94	19.09	152.58	0.77
4600.00	1.75	134.10	4599.58	-19.07	10.92	-19.07	21.97	150.20	0.08
4700.00	1.70	157.62	4699.53	-21.50	12.58	-21.50	24.91	149.67	0.71
4800.00	1.67	147.54	4799.49	-24.10	13.93	-24.10	27.84	149.98	0.30
4900.00	1.31	135.72	4899.45	-26.15	15.51	-26.15	30.40	149.33	0.47
5000.00	1.49	131.61	4999.42	-27.83	17.28	-27.83	32.76	148.17	0.21
5100.00	1.32	120.21	5099.39	-29.28	19.25	-29.28	35.04	146.68	0.33
5200.00	1.31	156.03	5199.37	-30.90	20.71	-30.90	37.20	146.17	0.81
5300.00	1.20	127.51	5299.35	-32.59	22.00	-32.59	39.32	145.97	0.63
5400.00	1.24	146.07	5399.32	-34.12	23.44	-34.12	41.40	145.52	0.40
5500.00	1.12	166.72	5499.30	-35.97	24.27	-35.97	43.39	146.00	0.44
5600.00	1.73	176.02	5599.27	-38.42	24.60	-38.42	45.62	147.37	0.65
5700.00	1.44	195.36	5699.23	-41.14	24.37	-41.14	47.81	149.36	0.60
5800.00	1.61	204.44	5799.20	-43.62	23.46	-43.62	49.53	151.73	0.29
5900.00	1.51	225.69	5899.16	-45.81	21.94	-45.81	50.80	154.42	0.58
6000.00	1.25	262.89	5999.14	-46.87	19.91	-46.87	50.92	156.99	0.91
6100.00	1.17	265.32	6099.11	-47.09	17.80	-47.09	50.34	159.29	0.10
6200.00	0.54	252.88	6199.10	-47.31	16.34	-47.31	50.05	160.95	0.66
6300.00	0.36	21.01	6299.10	-47.15	16.01	-47.15	49.80	161.25	0.81
6400.00	0.32	70.33	6399.10	-46.77	16.38	-46.77	49.55	160.70	0.29
6500.00	0.56	70.16	6499.10	-46.51	17.10	-46.51	49.55	159.82	0.24
6600.00	0.24	67.53	6599.09	-46.26	17.75	-46.26	49.55	159.01	0.31
6700.00	0.55	90.72	6699.09	-46.19	18.42	-46.19	49.73	158.26	0.34
6800.00	0.46	51.59	6799.09	-45.94	19.21	-45.94	49.80	157.31	0.35
6900.00	0.62	79.87	6899.08	-45.60	20.06	-45.60	49.81	156.25	0.30

<div> HORIZONTAL DISPLACEMENT IS 49.81 FEET AT 156.25 DEGREES </div>
