

Company/ Well Name: NOBLE ENERGY/ GEMINI K1-13

API Number: 05-123-17669

Location: SW/4 SW/4 SEC.1-T4N-R66W

County/State/Country: WELD/ COLORADO/ USA

Field/Rig Name: WATTENBERG/LIGHTNING WIRE

VS-Azi: 0.00 Degrees

Latitude: 40.33500

Grid North = True North +0.50 degs

Grid Correction Applied = +0.50 degs

Service Company : VAUGHN ENERGY SERVICES

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01.ut

Minimum Curvature Method

Report Date/Time: 1/22/2016 / 08:12

Vaughn Energy Services

Corpus Christi , Texas

1-361-384-0602

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	0.39	292.38	100.00	0.13	-0.31	0.13	0.34	292.38	0.39
200.00	0.45	285.35	200.00	0.36	-1.01	0.36	1.07	289.79	0.08
300.00	0.25	307.61	299.99	0.60	-1.56	0.60	1.68	291.00	0.24
400.00	0.15	276.01	399.99	0.75	-1.86	0.75	2.01	291.80	0.14
500.00	0.26	249.67	499.99	0.68	-2.21	0.68	2.31	287.13	0.14
600.00	0.26	257.84	599.99	0.55	-2.64	0.55	2.70	281.79	0.04
700.00	0.22	273.04	699.99	0.51	-3.06	0.51	3.11	279.52	0.08
800.00	0.18	274.85	799.99	0.54	-3.41	0.54	3.45	278.94	0.04
900.00	0.08	297.77	899.99	0.58	-3.63	0.58	3.67	279.11	0.11
1000.00	0.19	247.92	999.99	0.55	-3.84	0.55	3.88	278.18	0.15
1100.00	0.29	247.98	1099.99	0.40	-4.23	0.40	4.24	275.34	0.10
1200.00	0.34	245.09	1199.99	0.17	-4.73	0.17	4.74	272.11	0.05
1300.00	0.27	251.04	1299.99	-0.03	-5.23	-0.03	5.23	269.69	0.08
1400.00	0.23	221.78	1399.99	-0.25	-5.58	-0.25	5.59	267.40	0.13
1500.00	0.43	214.72	1499.98	-0.71	-5.93	-0.71	5.97	263.18	0.20
1600.00	0.41	212.36	1599.98	-1.32	-6.33	-1.32	6.47	258.24	0.02
1700.00	0.18	205.70	1699.98	-1.76	-6.59	-1.76	6.83	255.02	0.23
1800.00	0.48	189.82	1799.98	-2.32	-6.73	-2.32	7.12	251.00	0.31
1900.00	0.30	189.76	1899.98	-2.99	-6.85	-2.99	7.47	246.43	0.18
2000.00	0.87	177.34	1999.97	-4.01	-6.86	-4.01	7.94	239.72	0.58
2100.00	0.73	153.86	2099.96	-5.34	-6.54	-5.34	8.44	230.80	0.35

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
2200.00	0.88	173.66	2199.95	-6.67	-6.18	-6.67	9.09	222.80	0.31
2300.00	0.63	215.64	2299.94	-7.88	-6.41	-7.88	10.16	219.15	0.59
2400.00	0.85	215.54	2399.93	-8.94	-7.17	-8.94	11.46	218.74	0.22
2500.00	0.80	213.95	2499.92	-10.12	-7.99	-10.12	12.90	218.30	0.06
2600.00	0.76	217.37	2599.91	-11.23	-8.79	-11.23	14.26	218.04	0.06
2700.00	0.80	219.54	2699.91	-12.30	-9.64	-12.30	15.62	218.08	0.04
2800.00	0.76	225.91	2799.90	-13.30	-10.56	-13.30	16.98	218.45	0.09
2900.00	0.50	218.09	2899.89	-14.11	-11.31	-14.11	18.08	218.71	0.27
3000.00	0.48	233.77	2999.89	-14.70	-11.92	-14.70	18.92	219.03	0.14
3100.00	0.32	246.12	3099.88	-15.06	-12.51	-15.06	19.58	219.71	0.18
3200.00	0.39	244.56	3199.88	-15.32	-13.07	-15.32	20.14	220.47	0.07
3300.00	0.46	284.54	3299.88	-15.37	-13.77	-15.37	20.63	221.86	0.30
3400.00	0.47	283.71	3399.88	-15.17	-14.55	-15.17	21.02	223.82	0.01
3500.00	0.56	287.65	3499.87	-14.92	-15.42	-14.92	21.46	225.94	0.09
3600.00	0.73	280.90	3599.87	-14.65	-16.51	-14.65	22.07	228.41	0.19
3700.00	0.70	296.93	3699.86	-14.26	-17.68	-14.26	22.71	231.12	0.20
3800.00	0.58	314.17	3799.85	-13.62	-18.59	-13.62	23.05	233.77	0.22
3900.00	0.60	281.59	3899.85	-13.16	-19.47	-13.16	23.51	235.94	0.33
4000.00	0.05	268.85	3999.84	-13.06	-20.03	-13.06	23.91	236.90	0.55
4100.00	0.22	183.73	4099.84	-13.25	-20.09	-13.25	24.07	236.59	0.22
4200.00	4.29	13.54	4199.76	-9.81	-19.23	-9.81	21.58	242.98	4.51
4300.00	8.39	178.22	4299.48	-13.47	-18.12	-13.47	22.58	233.36	12.58
4400.00	10.47	198.27	4398.15	-29.40	-20.74	-29.40	35.98	215.20	3.86
4500.00	12.48	219.93	4496.19	-46.33	-30.53	-46.33	55.49	213.39	4.72
4600.00	14.71	238.45	4593.43	-61.27	-48.30	-61.27	78.02	218.25	4.86
4700.00	15.79	253.68	4689.95	-71.74	-72.18	-71.74	101.77	225.18	4.14
4800.00	17.24	274.18	4785.90	-74.49	-100.04	-74.49	124.73	233.33	5.97
4900.00	20.26	278.73	4880.59	-70.78	-131.94	-70.78	149.72	241.79	3.36
5000.00	24.05	279.99	4973.19	-64.61	-169.13	-64.61	181.06	249.09	3.82
5100.00	28.21	283.92	5062.96	-55.39	-212.16	-55.39	219.27	255.37	4.51
5200.00	30.08	282.33	5150.29	-44.35	-259.59	-44.35	263.35	260.31	2.02
5300.00	29.56	284.78	5237.06	-32.70	-307.92	-32.70	309.66	263.94	1.32
5400.00	27.76	286.49	5324.80	-19.79	-354.11	-19.79	354.66	266.80	1.98
5500.00	29.66	283.44	5412.51	-7.43	-400.52	-7.43	400.59	268.94	2.40
5600.00	31.25	284.10	5498.70	4.64	-449.75	4.64	449.77	270.59	1.63
5700.00	31.41	285.90	5584.12	18.10	-499.97	18.10	500.30	272.07	0.95
5800.00	29.92	284.12	5670.14	31.32	-549.22	31.32	550.11	273.26	1.74
5900.00	30.29	283.91	5756.65	43.47	-597.88	43.47	599.46	274.16	0.39
6000.00	31.08	282.15	5842.65	54.97	-647.60	54.97	649.93	274.85	1.19
6100.00	29.33	285.73	5929.08	67.04	-696.41	67.04	699.63	275.50	2.51

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
6200.00	28.40	283.21	6016.66	79.12	-743.14	79.12	747.34	276.08	1.53
6300.00	30.02	281.60	6103.94	89.58	-790.80	89.58	795.86	276.46	1.80
6400.00	29.63	282.48	6190.69	99.95	-839.44	99.95	845.37	276.79	0.59
6500.00	30.76	281.09	6277.13	110.21	-888.67	110.21	895.48	277.07	1.33
6600.00	29.09	279.99	6363.79	119.35	-937.71	119.35	945.27	277.25	1.76
6700.00	28.55	277.32	6451.41	126.61	-985.35	126.61	993.45	277.32	1.39
6800.00	29.95	279.85	6538.67	133.93	-1033.64	133.93	1042.28	277.38	1.87
6900.00	27.51	279.80	6626.35	142.13	-1081.01	142.13	1090.31	277.49	2.44
7000.00	27.08	278.06	6715.22	149.26	-1126.30	149.26	1136.15	277.55	0.91
7100.00	24.49	276.99	6805.25	154.97	-1169.41	154.97	1179.64	277.55	2.63
7200.00	19.44	278.96	6897.97	160.09	-1206.45	160.09	1217.02	277.56	5.10
7300.00	15.85	281.09	6993.25	165.31	-1236.29	165.31	1247.29	277.62	3.65
7400.00	11.63	280.47	7090.37	169.77	-1259.61	169.77	1271.00	277.68	4.22