



Company/ Rig: Noble Energy/ CoreTech  
Well/API#: Larson USX AA 19-4/05-123-24332  
Declination: 8.33 Degrees  
TD as Drilled: 6956 Feet  
County/State: Weld/Colorado  
VS-Azi: 0.000 Degrees  
Latitude: 40.47701, Longitude: -104.48606  
Grid North = True North -0.71 degs (NAD 27)  
Grid Correction Applied = -0.71 degs



Depth Reference : RKB= GL/ Elevation= 4652 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro\_run01-01-de\_01.ut

Minimum Curvature Method

Report Date/Time: 2/10/2016 / 14:53

Lat & Long Obtained by Handheld GPS at Wellhead

North Reference: Grid

Henderson, Colorado

303-853-4976

Surveyor: Sean Bratt / Larson USX AA 19-4

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
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	****
100.000	0.296	121.358	100.000	-0.134	0.220	-0.134	0.258	121.358	0.296
200.000	0.148	71.223	199.999	-0.227	0.563	-0.227	0.607	111.936	0.231
300.000	0.363	156.495	299.998	-0.476	0.812	-0.476	0.941	120.359	0.381
400.000	0.339	226.212	399.997	-0.971	0.725	-0.971	1.211	143.257	0.402
500.000	0.728	195.051	499.992	-1.789	0.346	-1.789	1.822	169.049	0.472
600.000	0.826	190.952	599.983	-3.110	0.044	-3.110	3.111	179.185	0.113
700.000	0.515	186.810	699.976	-4.264	-0.146	-4.264	4.267	181.961	0.314
800.000	0.278	151.906	799.974	-4.925	-0.085	-4.925	4.925	180.991	0.328
900.000	0.159	173.266	899.973	-5.276	0.045	-5.276	5.276	179.510	0.142
1000.000	0.129	164.018	999.973	-5.521	0.092	-5.521	5.522	179.042	0.038
1100.000	0.125	219.765	1099.972	-5.714	0.054	-5.714	5.714	179.463	0.119
1200.000	0.352	334.320	1199.972	-5.521	-0.149	-5.521	5.523	181.548	0.419
1300.000	0.263	310.169	1299.970	-5.096	-0.458	-5.096	5.117	185.133	0.155
1400.000	0.355	64.135	1399.970	-4.813	-0.354	-4.813	4.826	184.212	0.521
1500.000	0.464	15.922	1499.967	-4.288	0.036	-4.288	4.288	179.524	0.349
1600.000	0.591	311.243	1599.964	-3.558	-0.241	-3.558	3.566	183.872	0.574
1700.000	0.063	269.697	1699.962	-3.219	-0.684	-3.219	3.291	191.993	0.545
1800.000	0.181	167.348	1799.962	-3.373	-0.705	-3.373	3.446	191.800	0.204

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
1900.000	0.341	196.536	1899.961	-3.812	-0.755	-3.812	3.886	191.201	0.204
2000.000	1.073	149.856	1999.953	-4.907	-0.369	-4.907	4.921	184.305	0.875
2100.000	1.354	143.666	2099.931	-6.668	0.801	-6.668	6.716	173.154	0.309
2200.000	1.396	138.660	2199.902	-8.535	2.305	-8.535	8.840	164.886	0.127
2300.000	1.499	130.823	2299.870	-10.304	4.099	-10.304	11.090	158.306	0.223
2400.000	1.522	124.299	2399.835	-11.907	6.186	-11.907	13.418	152.548	0.173
2500.000	1.476	115.523	2499.801	-13.210	8.445	-13.210	15.679	147.411	0.234
2600.000	1.512	115.850	2599.767	-14.340	10.794	-14.340	17.949	143.031	0.037
2700.000	1.141	127.159	2699.740	-15.517	12.775	-15.517	20.099	140.536	0.452
2800.000	1.385	118.925	2799.716	-16.703	14.626	-16.703	22.202	138.793	0.303
2900.000	1.235	132.575	2899.690	-18.017	16.477	-18.017	24.415	137.555	0.345
3000.000	1.406	107.972	2999.664	-19.124	18.438	-19.124	26.565	136.047	0.587
3100.000	1.554	127.091	3099.632	-20.321	20.687	-20.321	28.998	134.489	0.513
3200.000	1.122	113.481	3199.604	-21.529	22.667	-21.529	31.261	133.525	0.534
3300.000	1.050	110.918	3299.586	-22.246	24.421	-22.246	33.034	132.332	0.087
3400.000	0.696	50.281	3399.577	-22.185	25.743	-22.185	33.984	130.754	0.933
3500.000	0.625	343.684	3499.571	-21.274	26.057	-21.274	33.638	129.229	0.728
3600.000	0.976	30.668	3599.562	-20.017	26.338	-20.017	33.082	127.235	0.715
3700.000	1.251	28.172	3699.543	-18.322	27.289	-18.322	32.869	123.878	0.279
3800.000	1.292	43.357	3799.519	-16.540	28.578	-16.540	33.019	120.060	0.338
3900.000	1.284	15.507	3899.495	-14.640	29.652	-14.640	33.069	116.278	0.620
4000.000	1.350	28.224	3999.468	-12.522	30.508	-12.522	32.978	112.316	0.299
4100.000	0.966	11.636	4099.448	-10.658	31.236	-10.658	33.004	108.841	0.506
4200.000	0.672	6.661	4199.438	-9.250	31.474	-9.250	32.805	106.377	0.302
4300.000	1.088	350.039	4299.426	-7.732	31.378	-7.732	32.316	103.843	0.484
4400.000	0.951	330.211	4399.410	-6.076	30.801	-6.076	31.395	101.160	0.376
4500.000	1.219	340.565	4499.392	-4.353	30.035	-4.353	30.349	98.247	0.331
4600.000	1.132	359.570	4599.372	-2.362	29.674	-2.362	29.768	94.551	0.397
4700.000	1.292	8.771	4699.350	-0.260	29.838	-0.260	29.839	90.499	0.251
4800.000	1.607	25.573	4799.318	2.119	30.615	2.119	30.689	86.040	0.526
4900.000	1.353	27.542	4899.284	4.431	31.767	4.431	32.074	82.059	0.259
5000.000	1.396	28.424	4999.256	6.550	32.893	6.550	33.539	78.738	0.048
5100.000	0.953	17.590	5099.234	8.414	33.724	8.414	34.758	75.991	0.494
5200.000	0.532	20.528	5199.226	9.641	34.138	9.641	35.473	74.230	0.422
5300.000	0.780	114.378	5299.221	9.795	34.921	9.795	36.268	74.332	0.973
5400.000	0.750	104.602	5399.213	9.349	36.174	9.349	37.363	75.509	0.134
5500.000	1.542	137.541	5499.193	8.192	37.716	8.192	38.595	77.746	0.999
5600.000	1.649	121.700	5599.154	6.443	39.848	6.443	40.365	80.815	0.452
5700.000	1.817	133.397	5699.109	4.598	42.224	4.598	42.473	83.785	0.391
5800.000	1.586	135.633	5799.065	2.520	44.343	2.520	44.415	86.748	0.240

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
5900.000	2.405	133.348	5899.003	0.090	46.836	0.090	46.836	89.889	0.823
6000.000	2.700	133.426	5998.904	-2.969	50.072	-2.969	50.160	93.393	0.295
6100.000	2.684	132.797	6098.794	-6.178	53.501	-6.178	53.856	96.587	0.034
6200.000	2.709	123.690	6198.684	-9.079	57.184	-9.079	57.901	99.022	0.429
6300.000	2.796	129.876	6298.568	-11.953	61.022	-11.953	62.182	101.083	0.309
6400.000	3.040	119.924	6398.439	-14.840	65.192	-14.840	66.859	102.824	0.561
6500.000	3.520	119.741	6498.275	-17.685	70.155	-17.685	72.350	104.149	0.480
6600.000	3.860	118.127	6598.068	-20.795	75.789	-20.795	78.590	105.343	0.356
6700.000	1.901	105.343	6697.938	-22.821	80.357	-22.821	83.535	105.854	2.050