



Company/Rig: Noble Energy/ CoreTech
WELL/API#: HSR Larimer 13-24/05-123-16757
DECLINATION: 8.24 Degrees
TD AS DRILLED: 7119 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.37876, Longitude: -104.61884
Grid North = True North -0.57 degs (NAD 27)
Grid Correction Applied = -0.57 degs



DEPTH REFERENCE : RKB=GL/ ELEVATION= 4639 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 5/25/2016 / 15:16

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: Sean Bratt / HSR-Larimer 13-24

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
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	****
100.000	0.101	85.499	100.000	0.007	0.088	0.007	0.088	85.499	0.101
200.000	0.125	130.311	200.000	-0.056	0.259	-0.056	0.265	102.312	0.089
300.000	0.220	272.423	300.000	-0.119	0.149	-0.119	0.191	128.464	0.328
400.000	0.349	293.261	399.998	0.010	-0.323	0.010	0.323	271.761	0.163
500.000	0.268	305.345	499.997	0.266	-0.794	0.266	0.837	288.503	0.104
600.000	0.454	298.479	599.995	0.590	-1.333	0.590	1.458	293.873	0.190
700.000	0.482	306.239	699.992	1.028	-2.021	1.028	2.267	296.955	0.069
800.000	0.495	290.801	799.988	1.430	-2.764	1.430	3.111	297.352	0.132
900.000	0.572	294.269	899.984	1.788	-3.622	1.788	4.039	296.273	0.084
1000.000	0.469	273.006	999.980	2.014	-4.485	2.014	4.917	294.186	0.217
1100.000	0.564	256.308	1099.976	1.919	-5.372	1.919	5.704	289.663	0.177
1200.000	0.745	248.078	1199.969	1.560	-6.453	1.560	6.639	283.592	0.204
1300.000	0.713	237.887	1299.961	0.987	-7.583	0.987	7.647	277.415	0.133
1400.000	0.916	233.565	1399.951	0.182	-8.753	0.182	8.755	271.188	0.212
1500.000	0.737	237.842	1499.940	-0.635	-9.940	-0.635	9.960	266.343	0.190
1600.000	0.885	239.935	1599.930	-1.364	-11.153	-1.364	11.236	263.025	0.152
1700.000	0.884	241.547	1699.918	-2.119	-12.500	-2.119	12.678	260.378	0.025
1800.000	1.013	250.796	1799.905	-2.778	-14.013	-2.778	14.286	258.788	0.199

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	1.059	253.042	1899.888	-3.338	-15.732	-3.338	16.082	258.021	0.062
2000.000	1.178	265.028	1999.869	-3.697	-17.640	-3.697	18.024	258.165	0.262
2100.000	1.506	277.077	2099.842	-3.624	-19.969	-3.624	20.295	259.714	0.431
2200.000	1.525	282.728	2199.807	-3.169	-22.571	-3.169	22.793	262.009	0.151
2300.000	1.648	285.612	2299.769	-2.489	-25.254	-2.489	25.376	264.372	0.146
2400.000	1.552	289.497	2399.730	-1.650	-27.915	-1.650	27.964	266.617	0.145
2500.000	1.320	303.370	2499.699	-0.564	-30.153	-0.564	30.159	268.928	0.416
2600.000	1.278	306.369	2599.673	0.730	-32.013	0.730	32.022	271.307	0.080
2700.000	1.167	304.941	2699.650	1.975	-33.746	1.975	33.804	273.350	0.115
2800.000	0.962	312.205	2799.633	3.123	-35.203	3.123	35.342	275.069	0.245
2900.000	0.470	330.725	2899.625	4.044	-36.026	4.044	36.252	276.405	0.538
3000.000	0.571	335.808	2999.621	4.856	-36.430	4.856	36.753	277.593	0.111
3100.000	0.406	331.387	3099.617	5.621	-36.804	5.621	37.231	278.684	0.169
3200.000	0.114	252.595	3199.616	5.903	-37.069	5.903	37.536	279.048	0.400
3300.000	0.746	231.520	3299.613	5.468	-37.673	5.468	38.068	278.258	0.641
3400.000	1.091	244.198	3399.600	4.648	-39.041	4.648	39.316	276.789	0.398
3500.000	1.144	241.593	3499.581	3.759	-40.776	3.759	40.948	275.267	0.073
3600.000	1.061	226.631	3599.563	2.648	-42.327	2.648	42.409	273.580	0.298
3700.000	1.167	243.649	3699.544	1.560	-43.912	1.560	43.940	272.035	0.346
3800.000	1.171	233.252	3799.523	0.496	-45.644	0.496	45.647	270.623	0.212
3900.000	1.309	243.684	3899.500	-0.621	-47.487	-0.621	47.491	269.250	0.264
4000.000	1.273	238.303	3999.475	-1.712	-49.456	-1.712	49.486	268.018	0.126
4100.000	1.379	247.835	4099.448	-2.750	-51.516	-2.750	51.590	266.945	0.244
4200.000	1.572	240.770	4199.415	-3.873	-53.828	-3.873	53.967	265.884	0.265
4300.000	1.554	246.966	4299.378	-5.074	-56.272	-5.074	56.501	264.848	0.170
4400.000	1.748	254.876	4399.336	-6.002	-58.992	-6.002	59.297	264.191	0.299
4500.000	1.780	250.618	4499.289	-6.915	-61.930	-6.915	62.314	263.629	0.135
4600.000	1.896	260.073	4599.238	-7.716	-65.024	-7.716	65.480	263.233	0.324
4700.000	2.139	268.927	4699.176	-8.036	-68.519	-8.036	68.989	263.311	0.395
4800.000	2.290	282.268	4799.102	-7.646	-72.338	-7.646	72.741	263.966	0.536
4900.000	2.326	284.304	4899.021	-6.720	-76.257	-6.720	76.552	264.964	0.090
5000.000	2.369	274.711	4998.937	-6.049	-80.283	-6.049	80.511	265.691	0.395
5100.000	1.921	291.883	5098.868	-5.255	-83.898	-5.255	84.063	266.416	0.779
5200.000	1.068	297.110	5198.833	-4.206	-86.283	-4.206	86.386	267.210	0.863
5300.000	0.402	286.335	5298.824	-3.682	-87.449	-3.682	87.527	267.589	0.678
5400.000	0.414	248.032	5398.822	-3.719	-88.121	-3.719	88.199	267.583	0.268
5500.000	0.411	223.009	5498.819	-4.116	-88.701	-4.116	88.796	267.343	0.179
5600.000	0.481	189.049	5598.817	-4.793	-89.011	-4.793	89.140	266.918	0.269
5700.000	0.373	182.831	5698.814	-5.532	-89.093	-5.532	89.265	266.447	0.117
5800.000	0.613	171.443	5798.810	-6.387	-89.030	-6.387	89.259	265.897	0.258

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	0.592	180.669	5898.804	-7.432	-88.956	-7.432	89.266	265.224	0.099
6000.000	0.924	185.265	5998.796	-8.751	-89.036	-8.751	89.465	264.386	0.337
6100.000	1.540	183.333	6098.772	-10.896	-89.188	-10.896	89.852	263.035	0.618
6200.000	2.022	187.327	6198.723	-13.987	-89.492	-13.987	90.578	261.117	0.497
6300.000	2.470	190.975	6298.646	-17.852	-90.127	-17.852	91.878	258.796	0.470
6400.000	2.797	191.488	6398.541	-22.359	-91.023	-22.359	93.729	256.199	0.328
6500.000	2.935	189.910	6498.416	-27.272	-91.950	-27.272	95.909	253.480	0.159
6600.000	3.542	189.064	6598.255	-32.845	-92.877	-32.845	98.514	250.524	0.609
6700.000	3.617	189.040	6698.060	-39.011	-93.859	-39.011	101.643	247.431	0.074
6800.000	3.091	195.156	6797.889	-44.728	-95.060	-44.728	105.057	244.802	0.635