



Company/Rig: Noble Energy/ CoreTech  
WELL/API#: Roth 24-21/05-123-24578  
DECLINATION: 8.25 Degrees  
TD AS DRILLED: 7027 Feet  
COUNTY/STATE: Weld/Colorado  
VS-Azi: 0.000 Degrees  
Latitude: 40.47700, Longitude: -104.50096  
Grid North = True North -0.65 degs (NAD 27)  
Grid Convergence Applied = -0.65 degs



DEPTH REFERENCE : RKB=GL/ ELEVATION= 4646 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro\_run01-01-de\_01.ut  
Minimum Curvature Method  
Report Date/Time: 10/15/2015 / 10:45

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID  
HENDERSON, COLORADO  
303-853-4976

Surveyor: Sean Bratt / Roth 24-21

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	0.096	37.183	100.000	0.067	0.051	0.067	0.084	37.183	0.096
200.000	0.362	27.717	199.999	0.413	0.248	0.413	0.482	30.995	0.267
300.000	0.258	324.586	299.998	0.876	0.264	0.876	0.915	16.793	0.336
400.000	0.418	10.072	399.996	1.418	0.198	1.418	1.432	7.930	0.300
500.000	0.522	24.847	499.993	2.191	0.453	2.191	2.237	11.679	0.159
600.000	0.516	18.101	599.989	3.033	0.784	3.033	3.132	14.501	0.061
700.000	0.218	3.204	699.987	3.650	0.935	3.650	3.768	14.365	0.311
800.000	0.560	28.711	799.984	4.268	1.180	4.268	4.428	15.455	0.375
900.000	0.591	19.950	899.979	5.181	1.591	5.181	5.420	17.066	0.093
1000.000	0.470	40.791	999.975	5.976	2.034	5.976	6.313	18.799	0.226
1100.000	0.398	334.290	1099.973	6.600	2.151	6.600	6.942	18.056	0.480
1200.000	0.297	11.958	1199.971	7.166	2.055	7.166	7.455	15.997	0.244
1300.000	0.312	7.581	1299.970	7.690	2.144	7.690	7.984	15.580	0.028
1400.000	0.404	13.263	1399.968	8.304	2.261	8.304	8.606	15.232	0.098
1500.000	0.310	325.425	1499.966	8.870	2.188	8.870	9.136	13.859	0.302
1600.000	0.567	334.329	1599.963	9.539	1.820	9.539	9.711	10.804	0.265
1700.000	0.163	349.582	1699.961	10.125	1.580	10.125	10.248	8.870	0.412
1800.000	0.094	249.796	1799.960	10.237	1.477	10.237	10.343	8.212	0.202

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	0.412	67.332	1899.960	10.347	1.732	10.347	10.491	9.503	0.506
2000.000	0.496	58.488	1999.957	10.712	2.433	10.712	10.985	12.797	0.109
2100.000	0.742	100.809	2099.951	10.817	3.438	10.817	11.351	17.633	0.502
2200.000	0.890	87.994	2199.941	10.723	4.851	10.723	11.769	24.340	0.234
2300.000	1.178	68.491	2299.925	11.127	6.583	11.127	12.929	30.611	0.451
2400.000	1.258	62.433	2399.902	12.012	8.513	12.012	14.723	35.325	0.151
2500.000	1.285	62.510	2499.878	13.038	10.481	13.038	16.728	38.795	0.027
2600.000	1.235	57.469	2599.854	14.135	12.384	14.135	18.792	41.223	0.122
2700.000	1.203	52.836	2699.831	15.348	14.129	15.348	20.861	42.631	0.104
2800.000	1.183	54.693	2799.809	16.579	15.808	16.579	22.907	43.636	0.043
2900.000	1.158	47.896	2899.789	17.853	17.400	17.853	24.929	44.263	0.141
3000.000	1.122	40.370	2999.769	19.276	18.783	19.276	26.914	44.258	0.154
3100.000	1.233	29.612	3099.748	20.957	19.949	20.957	28.933	43.588	0.247
3200.000	0.511	26.998	3199.736	22.290	20.683	22.290	30.407	42.858	0.723
3300.000	0.483	104.440	3299.733	22.582	21.293	22.582	31.038	43.317	0.622
3400.000	0.673	125.015	3399.728	22.140	22.182	22.140	31.340	45.054	0.279
3500.000	0.811	143.417	3499.720	21.235	23.085	21.235	31.366	47.390	0.274
3600.000	0.947	148.939	3599.708	19.958	23.933	19.958	31.163	50.174	0.160
3700.000	1.312	152.482	3699.688	18.235	24.888	18.235	30.854	53.770	0.371
3800.000	1.512	151.582	3799.658	16.059	26.045	16.059	30.598	58.342	0.201
3900.000	1.648	145.678	3899.620	13.712	27.484	13.712	30.714	63.485	0.212
4000.000	1.106	146.410	3999.591	11.720	28.828	11.720	31.120	67.876	0.542
4100.000	1.036	146.705	4099.573	10.161	29.858	10.161	31.540	71.207	0.071
4200.000	0.484	152.792	4199.564	9.030	30.548	9.030	31.854	73.532	0.557
4300.000	0.205	143.816	4299.562	8.510	30.846	8.510	31.998	74.576	0.283
4400.000	0.192	45.931	4399.562	8.483	31.072	8.483	32.209	74.730	0.299
4500.000	0.555	280.058	4499.560	8.684	30.716	8.684	31.920	74.213	0.685
4600.000	0.967	243.541	4599.552	8.392	29.483	8.392	30.654	74.111	0.617
4700.000	1.244	197.756	4699.535	6.982	28.396	6.982	29.242	76.186	0.897
4800.000	1.408	240.204	4799.510	5.337	26.999	5.337	27.521	78.818	0.972
4900.000	1.670	262.829	4899.475	4.545	24.486	4.545	24.905	79.485	0.656
5000.000	1.688	234.045	4999.434	3.498	21.848	3.498	22.127	80.904	0.835
5100.000	1.697	227.732	5099.390	1.638	19.561	1.638	19.629	85.214	0.187
5200.000	1.556	230.304	5199.350	-0.225	17.421	-0.225	17.422	90.741	0.158
5300.000	1.787	196.522	5299.310	-2.588	15.932	-2.588	16.141	99.226	0.996
5400.000	1.902	203.913	5399.258	-5.600	14.816	-5.600	15.839	110.706	0.264
5500.000	1.004	220.037	5499.225	-7.788	13.580	-7.788	15.654	119.836	0.978
5600.000	0.245	301.508	5599.220	-8.348	12.834	-8.348	15.310	123.042	0.998
5700.000	0.119	118.144	5699.220	-8.285	12.744	-8.285	15.200	123.030	0.364
5800.000	0.223	35.802	5799.219	-8.177	12.949	-8.177	15.315	122.270	0.238

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	0.395	4.302	5899.218	-7.676	13.089	-7.676	15.174	120.388	0.236
6000.000	0.564	329.324	5999.214	-6.908	12.864	-6.908	14.601	118.238	0.331
6100.000	0.464	324.286	6099.210	-6.156	12.376	-6.156	13.823	116.447	0.110
6200.000	0.654	334.513	6199.206	-5.312	11.894	-5.312	13.027	114.067	0.214
6300.000	0.581	351.326	6299.200	-4.296	11.572	-4.296	12.344	110.366	0.195
6400.000	0.483	354.675	6399.196	-3.375	11.457	-3.375	11.943	106.417	0.103
6500.000	0.510	327.244	6499.192	-2.582	11.177	-2.582	11.471	103.008	0.237
6600.000	1.355	302.837	6599.178	-1.567	9.942	-1.567	10.065	98.955	0.916
6700.000	1.569	285.357	6699.146	-0.563	7.628	-0.563	7.649	94.220	0.492