



Company/Rig: NOBLE ENERGY/ CORETECH  
WELL/API#: ROTH 12-30/05-123-13046  
DECLINATION: 8.3 Degrees  
TD AS DRILLED: 7037 Feet  
COUNTY/STATE: WELD/COLORADO  
VS-Azi: 0.000 Degrees  
Latitude: 40.45505, Longitude: -104.59992  
Grid North = True North -0.58 degs (NAD 27)  
Grid Convergence Applied = -0.58 degs



DEPTH REFERENCE : RKB=SURFACE ELEVATION=4664

DRILLOG MS GYRO SURVEY CALCULATIONS

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

Minimum Curvature Method

Report Date/Time: 10/13/2015 / 09:23

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: BRIAN BREWBAKER / Roth 12-30

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	0.367	36.561	99.999	0.257	0.191	0.257	0.320	36.561	0.367
200.000	0.326	28.571	199.997	0.764	0.517	0.764	0.922	34.102	0.063
300.000	0.407	351.396	299.996	1.365	0.600	1.365	1.491	23.739	0.246
400.000	0.288	15.242	399.994	1.958	0.613	1.958	2.052	17.387	0.185
500.000	0.215	37.210	499.993	2.350	0.793	2.350	2.480	18.640	0.119
600.000	0.342	341.246	599.992	2.782	0.810	2.782	2.897	16.238	0.284
700.000	0.457	1.132	699.989	3.463	0.722	3.463	3.538	11.778	0.179
800.000	0.326	338.121	799.987	4.126	0.624	4.126	4.173	8.598	0.202
900.000	0.259	7.593	899.986	4.615	0.548	4.615	4.647	6.770	0.162
1000.000	0.209	13.983	999.985	5.016	0.622	5.016	5.055	7.067	0.056
1100.000	0.301	357.273	1099.984	5.456	0.653	5.456	5.495	6.829	0.117
1200.000	0.350	345.651	1199.982	6.015	0.565	6.015	6.041	5.370	0.082
1300.000	0.414	334.421	1299.980	6.636	0.334	6.636	6.645	2.877	0.099
1400.000	0.494	325.835	1399.977	7.320	-0.065	7.320	7.320	359.492	0.105
1500.000	0.450	329.690	1499.974	8.016	-0.506	8.016	8.032	356.392	0.054
1600.000	0.446	323.899	1599.971	8.669	-0.933	8.669	8.720	353.857	0.046
1700.000	0.460	317.704	1699.967	9.281	-1.433	9.281	9.391	351.225	0.051
1800.000	0.464	320.754	1799.964	9.892	-1.959	9.892	10.084	348.796	0.025

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	0.194	5.033	1899.963	10.375	-2.201	10.375	10.605	348.022	0.353
2000.000	0.301	76.752	1999.962	10.603	-1.930	10.603	10.778	349.683	0.303
2100.000	0.513	98.440	2099.959	10.598	-1.232	10.598	10.669	353.372	0.258
2200.000	0.556	104.673	2199.955	10.410	-0.320	10.410	10.414	358.240	0.072
2300.000	0.712	107.376	2299.949	10.101	0.742	10.101	10.128	4.202	0.159
2400.000	0.748	90.397	2399.941	9.911	1.988	9.911	10.108	11.344	0.219
2500.000	0.454	101.506	2499.935	9.827	3.029	9.827	10.284	17.133	0.315
2600.000	0.472	152.913	2599.932	9.382	3.605	9.382	10.051	21.020	0.402
2700.000	0.569	145.138	2699.928	8.608	4.077	8.608	9.524	25.342	0.120
2800.000	0.528	135.649	2799.924	7.871	4.682	7.871	9.158	30.748	0.100
2900.000	0.594	146.420	2899.919	7.109	5.291	7.109	8.862	36.657	0.125
3000.000	0.411	176.619	2999.915	6.319	5.599	6.319	8.443	41.541	0.316
3100.000	0.557	145.692	3099.912	5.560	5.894	5.560	8.103	46.674	0.294
3200.000	0.711	143.204	3199.906	4.661	6.540	4.661	8.031	54.524	0.156
3300.000	0.906	129.716	3299.896	3.659	7.520	3.659	8.363	64.053	0.271
3400.000	1.124	118.886	3399.880	2.680	8.986	2.680	9.378	73.393	0.290
3500.000	1.215	110.468	3499.859	1.836	10.839	1.836	10.993	80.387	0.194
3600.000	1.210	107.250	3599.837	1.152	12.840	1.152	12.891	84.873	0.068
3700.000	1.282	110.172	3699.813	0.453	14.898	0.453	14.904	88.257	0.096
3800.000	1.378	114.773	3799.786	-0.436	17.039	-0.436	17.045	91.467	0.144
3900.000	1.307	110.512	3899.759	-1.340	19.199	-1.340	19.246	93.992	0.123
4000.000	1.148	112.286	3999.736	-2.119	21.194	-2.119	21.300	95.710	0.163
4100.000	0.912	109.628	4099.720	-2.767	22.871	-2.767	23.037	96.897	0.241
4200.000	0.652	114.449	4199.710	-3.269	24.139	-3.269	24.359	97.713	0.268
4300.000	0.550	124.270	4299.705	-3.775	25.054	-3.775	25.336	98.570	0.145
4400.000	0.401	134.616	4399.701	-4.292	25.700	-4.292	26.056	99.481	0.172
4500.000	0.192	125.430	4499.700	-4.635	26.086	-4.635	26.494	100.075	0.214
4600.000	0.578	70.922	4599.698	-4.567	26.699	-4.567	27.086	99.707	0.492
4700.000	0.655	56.720	4699.692	-4.089	27.653	-4.089	27.954	98.411	0.170
4800.000	0.789	21.515	4799.685	-3.135	28.383	-3.135	28.556	96.303	0.455
4900.000	1.168	346.713	4899.671	-1.503	28.401	-1.503	28.441	93.029	0.688
5000.000	1.178	345.836	4999.650	0.486	27.915	0.486	27.920	89.002	0.021
5100.000	0.840	339.642	5099.634	2.170	27.409	2.170	27.495	85.473	0.355
5200.000	0.368	340.495	5199.628	3.159	27.047	3.159	27.231	83.337	0.472
5300.000	0.262	2.637	5299.627	3.690	26.950	3.690	27.202	82.203	0.159
5400.000	0.242	12.068	5399.626	4.125	27.005	4.125	27.318	81.314	0.046
5500.000	0.253	357.301	5499.625	4.552	27.039	4.552	27.419	80.444	0.064
5600.000	0.264	32.993	5599.624	4.966	27.154	4.966	27.604	79.637	0.159
5700.000	0.191	10.377	5699.623	5.322	27.309	5.322	27.823	78.971	0.114
5800.000	0.067	2.763	5799.623	5.544	27.342	5.544	27.898	78.537	0.125

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	0.090	317.703	5899.623	5.661	27.292	5.661	27.873	78.282	0.064
6000.000	0.237	225.167	5999.622	5.574	27.092	5.574	27.659	78.375	0.257
6100.000	0.761	212.415	6099.618	4.867	26.589	4.867	27.031	79.627	0.533
6200.000	1.404	199.583	6199.600	3.153	25.823	3.153	26.015	83.039	0.683
6300.000	0.895	160.007	6299.581	1.264	25.679	1.264	25.710	87.181	0.914
6400.000	0.506	121.059	6399.574	0.302	26.325	0.302	26.326	89.342	0.594
6500.000	0.895	88.457	6499.567	0.096	27.483	0.096	27.484	89.800	0.543
6600.000	1.363	79.791	6599.547	0.327	29.435	0.327	29.436	89.363	0.496
6700.000	1.383	80.267	6699.518	0.742	31.794	0.742	31.803	88.663	0.023
6800.000	0.820	51.616	6799.500	1.390	33.544	1.390	33.573	87.627	0.771