



Company/Rig: Noble Energy Inc/Production
WELL/API#: Betz PC G 10-33D/05-123-32531
DECLINATION: 8.28 Degrees
TD AS DRILLED: 7445'
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.32096, Longitude: -104.66115
Grid North = True North -0.54 degs (NAD 27)
Grid Correction Applied = -0.54 degs



DEPTH REFERENCE : RKB=GL/Elevation=4717'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 3/2/2016 / 13:35

Lat/Long Obtained By Handheld GPS at Wellhead

North Reference: Grid

Denver, Colorado

303-853-4976

Surveyor: Jason Kinchelow / Betz PC G 10-33D

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	0.121	291.062	100.000	0.038	-0.098	0.038	0.105	291.062	0.121
200.000	0.292	327.458	199.999	0.291	-0.334	0.291	0.443	311.040	0.208
300.000	0.186	308.017	299.998	0.606	-0.599	0.606	0.852	315.315	0.132
400.000	0.207	289.699	399.998	0.767	-0.898	0.767	1.180	310.511	0.066
500.000	0.264	338.476	499.997	1.042	-1.152	1.042	1.554	312.125	0.201
600.000	0.643	336.824	599.994	1.772	-1.458	1.772	2.294	320.560	0.379
700.000	0.721	344.579	699.987	2.894	-1.846	2.894	3.433	327.475	0.121
800.000	0.666	22.127	799.980	4.040	-1.794	4.040	4.420	336.052	0.450
900.000	4.097	90.316	899.887	4.558	1.998	4.558	4.977	23.670	3.898
1000.000	5.405	85.210	999.542	4.932	10.264	4.932	11.387	64.334	1.374
1100.000	8.251	81.868	1098.823	6.341	22.063	6.341	22.956	73.966	2.873
1200.000	9.464	70.243	1197.636	10.135	36.906	10.135	38.272	74.643	2.156
1300.000	10.341	57.308	1296.158	17.763	52.199	17.763	55.138	71.207	2.384
1400.000	11.919	45.708	1394.286	29.824	67.147	29.824	73.472	66.051	2.732
1500.000	12.341	41.814	1492.055	45.001	81.664	45.001	93.242	61.143	0.920
1600.000	14.066	40.091	1589.408	62.264	96.616	62.264	114.941	57.200	1.769
1700.000	15.027	40.626	1686.202	81.400	112.883	81.400	139.171	54.205	0.970
1800.000	15.705	38.061	1782.627	101.896	129.668	101.896	164.914	51.839	0.960

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	16.405	38.881	1878.727	123.545	146.876	123.545	191.927	49.931	0.736
2000.000	16.580	40.352	1974.613	145.411	164.978	145.411	219.914	48.607	0.453
2100.000	16.398	39.365	2070.500	167.198	183.169	167.198	248.004	47.610	0.334
2200.000	16.911	38.858	2166.305	189.437	201.247	189.437	276.382	46.732	0.533
2300.000	16.493	35.200	2262.089	212.363	218.555	212.363	304.736	45.823	1.131
2400.000	14.900	38.400	2358.358	234.039	234.725	234.039	331.467	45.084	1.812
2500.000	14.901	38.273	2454.996	254.209	250.674	254.209	357.015	44.599	0.032
2600.000	15.892	40.170	2551.406	274.765	267.470	274.765	383.453	44.229	1.111
2700.000	17.170	38.621	2647.271	296.760	285.516	296.760	411.808	43.894	1.352
2800.000	17.128	38.131	2742.826	319.875	303.821	319.875	441.165	43.526	0.151
2900.000	16.840	36.090	2838.465	343.163	321.446	343.163	470.200	43.128	0.662
3000.000	16.150	35.698	2934.349	366.163	338.094	366.163	498.380	42.718	0.699
3100.000	16.807	36.923	3030.241	389.016	354.895	389.016	526.577	42.374	0.743
3200.000	16.097	40.361	3126.149	411.138	372.558	411.138	554.828	42.182	1.205
3300.000	14.208	38.756	3222.668	431.274	389.221	431.274	580.939	42.066	1.935
3400.000	12.979	39.233	3319.865	449.543	404.006	449.543	604.409	41.946	1.235
3500.000	13.337	46.119	3417.246	466.237	419.423	466.237	627.130	41.974	1.607
3600.000	13.704	44.965	3514.474	482.613	436.107	482.613	650.465	42.102	0.455
3700.000	14.736	44.862	3611.409	500.009	453.450	500.009	675.000	42.204	1.032
3800.000	14.676	45.846	3708.133	517.848	471.510	517.848	700.348	42.318	0.257
3900.000	15.593	46.569	3804.664	535.913	490.360	535.913	726.399	42.458	0.936
4000.000	16.446	41.352	3900.785	555.780	509.474	555.780	753.960	42.511	1.672
4100.000	16.416	41.806	3996.701	576.939	528.245	576.939	782.242	42.477	0.132
4200.000	16.610	42.297	4092.576	598.044	547.284	598.044	810.664	42.462	0.239
4300.000	17.117	40.522	4188.276	619.803	566.464	619.803	839.665	42.426	0.722
4400.000	16.453	42.589	4284.016	641.416	585.610	641.416	868.535	42.396	0.893
4500.000	17.238	39.353	4379.727	663.300	604.590	663.300	897.494	42.349	1.223
4600.000	17.227	38.476	4475.238	686.350	623.199	686.350	927.067	42.239	0.260
4700.000	16.544	39.990	4570.926	708.851	641.563	708.851	956.072	42.147	0.812
4800.000	16.768	40.937	4666.731	730.657	660.164	730.657	984.721	42.098	0.351
4900.000	17.009	43.246	4762.419	752.208	679.636	752.208	1013.766	42.099	0.713
5000.000	16.200	42.433	4858.249	773.157	699.069	773.157	1042.338	42.119	0.841
5100.000	15.663	39.731	4954.409	793.835	717.110	793.835	1069.776	42.093	0.915
5200.000	13.842	38.689	5051.108	813.555	733.217	813.555	1095.208	42.027	1.840
5300.000	10.745	38.116	5148.803	830.231	746.452	830.231	1116.456	41.958	3.100
5400.000	8.732	38.480	5247.357	843.508	756.930	843.508	1133.336	41.904	2.014
5500.000	7.437	37.928	5346.361	854.556	765.632	854.556	1147.370	41.858	1.297
5600.000	5.267	38.788	5445.742	863.239	772.486	863.239	1158.411	41.824	2.172
5700.000	1.393	67.171	5545.558	867.289	776.483	867.289	1164.095	41.838	4.095
5800.000	1.032	116.136	5645.538	867.364	778.411	867.364	1165.438	41.906	1.057

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	0.487	52.713	5745.530	867.225	779.558	867.225	1166.100	41.953	0.923
6000.000	0.132	37.289	5845.529	867.574	779.965	867.574	1166.632	41.956	0.362
6100.000	0.155	152.351	5945.529	867.545	780.098	867.545	1166.699	41.962	0.242
6200.000	0.057	134.682	6045.528	867.390	780.196	867.390	1166.650	41.971	0.102
6300.000	0.076	248.304	6145.528	867.330	780.170	867.330	1166.588	41.972	0.112
6400.000	0.209	197.144	6245.528	867.132	780.054	867.132	1166.363	41.974	0.171
6500.000	0.388	105.397	6345.527	866.868	780.327	866.868	1166.349	41.993	0.446
6600.000	0.392	133.552	6445.525	866.543	780.901	866.543	1166.491	42.024	0.190
6700.000	0.376	128.153	6545.523	866.104	781.406	866.104	1166.504	42.057	0.040
6800.000	0.548	146.257	6645.519	865.504	781.930	865.504	1166.410	42.096	0.224
6900.000	0.675	137.027	6745.514	864.675	782.597	864.675	1166.243	42.147	0.160
7000.000	0.864	140.683	6845.505	863.661	783.476	863.661	1166.081	42.213	0.195
7100.000	0.769	151.294	6945.495	862.489	784.276	862.489	1165.752	42.281	0.178
7150.000	0.638	132.841	6995.491	862.006	784.641	862.006	1165.640	42.310	0.521