



Company/Rig: Noble Energy/Production/CoreTech
WELL/API#: LF RANCH 32-09/05-123-21074
DECLINATION: 8.01 Degrees
TD AS DRILLED: 7527'
COUNTY/STATE: WELD/COLORADO
VS-Azi: 0.000 Degrees
Latitude: 40.32815, Longitude: -104.44026
Grid North = True North -0.68 degs (NAD 27)
Grid Correction Applied = -0.68 degs



Depth Reference : RKB=SURFACE ELEVATION=4698'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: run1-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 7/25/2017 / 13:43

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

COMMERCE CITY, COLORADO

303-853-4976

Surveyor: JAY HINMAN / LF Ranch 32-09

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	0.615	306.591	99.998	0.320	-0.431	0.320	0.537	306.591	0.615
200.000	1.197	287.245	199.985	0.950	-1.860	0.950	2.089	297.054	0.649
300.000	2.077	274.004	299.944	1.386	-4.666	1.386	4.867	286.547	0.952
400.000	2.931	265.497	399.848	1.312	-9.023	1.312	9.118	278.273	0.929
500.000	3.542	278.705	499.689	1.579	-14.625	1.579	14.710	276.161	0.960
600.000	4.492	280.052	599.442	2.730	-21.534	2.730	21.707	277.224	0.956
700.000	5.427	282.114	699.067	4.406	-30.015	4.406	30.336	278.351	0.952
800.000	6.108	278.847	798.560	6.217	-39.896	6.217	40.377	278.857	0.756
900.000	6.376	278.656	897.967	7.871	-50.642	7.871	51.250	278.834	0.268
1000.000	6.471	277.079	997.340	9.401	-61.724	9.401	62.436	278.660	0.201
1100.000	6.226	276.796	1096.726	10.737	-72.701	10.737	73.490	278.401	0.247
1200.000	5.779	277.539	1196.178	12.039	-83.077	12.039	83.944	278.246	0.454
1300.000	5.929	274.546	1295.656	13.109	-93.216	13.109	94.133	278.005	0.340
1400.000	6.100	276.891	1395.106	14.156	-103.640	14.156	104.602	277.778	0.299
1500.000	5.277	274.637	1494.613	15.165	-113.499	15.165	114.508	277.610	0.852
1600.000	4.435	275.761	1594.253	15.925	-121.930	15.925	122.965	277.441	0.848
1700.000	4.166	268.363	1693.972	16.209	-129.408	16.209	130.419	277.140	0.616
1800.000	3.858	264.280	1793.727	15.770	-136.386	15.770	137.295	276.596	0.420

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	3.628	258.367	1893.514	14.797	-142.833	14.797	143.597	275.914	0.449
2000.000	3.067	255.480	1993.343	13.488	-148.522	13.488	149.133	275.189	0.586
2100.000	3.170	249.707	2093.195	11.858	-153.705	11.858	154.162	274.412	0.330
2200.000	2.572	249.122	2193.069	10.100	-158.395	10.100	158.717	273.648	0.599
2300.000	1.711	252.023	2292.999	8.839	-161.911	8.839	162.152	273.125	0.868
2400.000	1.564	227.421	2392.959	7.455	-164.336	7.455	164.505	272.598	0.712
2500.000	1.136	231.605	2492.931	5.916	-166.118	5.916	166.223	272.040	0.439
2600.000	0.459	237.951	2592.921	5.088	-167.235	5.088	167.312	271.743	0.682
2700.000	0.252	111.813	2692.920	4.793	-167.370	4.793	167.438	271.640	0.641
2800.000	0.470	31.162	2792.918	5.063	-166.953	5.063	167.030	271.737	0.496
2900.000	0.250	17.252	2892.916	5.622	-166.677	5.622	166.771	271.932	0.235
3000.000	0.116	62.219	2992.916	5.877	-166.522	5.877	166.626	272.021	0.187
3100.000	0.925	155.119	3092.911	5.192	-166.093	5.192	166.174	271.790	0.938
3200.000	1.678	178.295	3192.885	2.996	-165.710	2.996	165.737	271.036	0.904
3300.000	2.304	191.661	3292.825	-0.436	-166.072	-0.436	166.073	269.849	0.775
3400.000	2.916	192.398	3392.721	-4.889	-167.025	-4.889	167.096	268.323	0.613
3500.000	3.388	192.480	3492.569	-10.258	-168.209	-10.258	168.522	266.510	0.473
3600.000	3.764	191.758	3592.374	-16.357	-169.517	-16.357	170.304	264.489	0.378
3700.000	4.210	192.739	3692.132	-23.151	-170.995	-23.151	172.555	262.290	0.451
3800.000	4.324	194.084	3791.855	-30.387	-172.722	-30.387	175.374	260.022	0.151
3900.000	4.481	190.546	3891.560	-37.883	-174.354	-37.883	178.422	257.741	0.314
4000.000	4.381	187.872	3991.261	-45.507	-175.592	-45.507	181.393	255.471	0.229
4100.000	4.595	187.032	4090.955	-53.266	-176.606	-53.266	184.464	253.216	0.223
4200.000	4.444	185.693	4190.644	-61.097	-177.480	-61.097	187.702	251.004	0.184
4300.000	4.400	188.729	4290.346	-68.744	-178.447	-68.744	191.230	248.932	0.238
4400.000	3.741	199.099	4390.095	-75.618	-180.096	-75.618	195.327	247.224	0.985
4500.000	3.474	207.733	4489.897	-81.382	-182.574	-81.382	199.891	245.975	0.604
4600.000	2.965	208.518	4589.739	-86.337	-185.219	-86.337	204.353	245.008	0.511
4700.000	2.578	200.194	4689.622	-90.721	-187.230	-90.721	208.051	244.148	0.557
4800.000	2.473	201.853	4789.525	-94.834	-188.810	-94.834	211.288	243.331	0.128
4900.000	2.181	205.595	4889.443	-98.553	-190.435	-98.553	214.425	242.638	0.329
5000.000	1.545	209.342	4989.389	-101.444	-191.917	-101.444	217.079	242.140	0.648
5100.000	0.953	230.813	5089.366	-103.144	-193.222	-103.144	219.029	241.906	0.744
5200.000	0.880	260.021	5189.353	-103.803	-194.623	-103.803	220.575	241.927	0.468
5300.000	1.039	262.132	5289.339	-104.060	-196.278	-104.060	222.157	242.069	0.163
5400.000	1.040	302.742	5389.324	-103.694	-197.939	-103.694	223.456	242.351	0.721
5500.000	1.022	302.149	5489.308	-102.729	-199.457	-102.729	224.358	242.750	0.021
5600.000	1.130	283.502	5589.291	-102.024	-201.171	-102.024	225.563	243.108	0.365
5700.000	1.113	300.028	5689.272	-101.308	-202.970	-101.308	226.848	243.475	0.323

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
5800.000	1.852	315.022	5789.238	-99.679	-204.953	-99.679	227.907	244.064	0.828
5900.000	2.203	315.942	5889.175	-97.155	-207.431	-97.155	229.057	244.903	0.353
6000.000	2.107	298.843	5989.106	-94.887	-210.378	-94.887	230.787	245.723	0.648
6100.000	1.293	282.906	6089.061	-93.748	-213.088	-93.748	232.799	246.253	0.934
6200.000	1.073	234.553	6189.042	-94.039	-214.951	-94.039	234.621	246.371	0.989
6300.000	0.517	197.751	6289.033	-95.012	-215.851	-95.012	235.837	246.242	0.728
6400.000	1.053	161.049	6389.024	-96.310	-215.690	-96.310	236.216	245.938	0.709
6500.000	0.630	125.079	6489.013	-97.495	-214.942	-97.495	236.020	245.602	0.657
6600.000	0.784	99.055	6589.006	-97.918	-213.817	-97.918	235.171	245.394	0.352