



Company/Rig: Noble Energy/CoreTech
WELL/API#: Larson USX AA 19-3/05-123-24480
DECLINATION: Degrees
TD AS DRILLED: 7001 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.47717, Longitude: -104.48163
Grid North = True North -0.66 degs (NAD 27)
Grid Correction Applied = -0.66 degs



DEPTH REFERENCE : RKB=GL Elevation=4656 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: survey-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 1/25/2016 / 14:34

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: Geof Davis / Larson USX AA 19-3

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	0.466	47.968	99.999	0.272	0.302	0.272	0.407	47.968	0.466
200.000	0.224	76.867	199.997	0.589	0.794	0.589	0.988	53.441	0.291
300.000	0.512	15.724	299.995	1.063	1.105	1.063	1.533	46.110	0.449
400.000	0.343	0.315	399.992	1.792	1.227	1.792	2.172	34.411	0.203
500.000	0.679	43.887	499.989	2.519	1.640	2.519	3.006	33.074	0.492
600.000	0.495	74.830	599.984	3.059	2.469	3.059	3.931	38.902	0.360
700.000	0.673	70.384	699.978	3.369	3.439	3.369	4.814	45.586	0.183
800.000	0.471	90.397	799.973	3.564	4.403	3.564	5.665	51.016	0.281
900.000	0.510	24.797	899.970	3.965	5.001	3.965	6.382	51.591	0.533
1000.000	0.498	80.409	999.967	4.442	5.617	4.442	7.161	51.663	0.471
1100.000	0.415	65.838	1099.964	4.663	6.376	4.663	7.899	53.824	0.142
1200.000	0.440	49.681	1199.961	5.059	7.000	5.059	8.636	54.141	0.123
1300.000	0.444	55.725	1299.958	5.525	7.612	5.525	9.406	54.025	0.047
1400.000	0.297	63.305	1399.956	5.860	8.164	5.860	10.050	54.329	0.154
1500.000	0.290	88.955	1499.955	5.981	8.649	5.981	10.515	55.332	0.131
1600.000	0.227	106.039	1599.954	5.931	9.092	5.931	10.856	56.881	0.098
1700.000	0.349	188.600	1699.953	5.575	9.237	5.575	10.789	58.888	0.391
1800.000	0.795	196.115	1799.948	4.607	8.999	4.607	10.110	62.890	0.451

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	1.277	192.046	1899.931	2.851	8.574	2.851	9.035	71.606	0.487
2000.000	1.706	193.957	1999.897	0.317	7.982	0.317	7.989	87.725	0.432
2100.000	2.198	174.616	2099.840	-3.036	7.803	-3.036	8.373	111.261	0.815
2200.000	2.384	166.850	2199.760	-6.970	8.456	-6.970	10.959	129.497	0.362
2300.000	2.782	150.728	2299.660	-11.113	10.116	-11.113	15.028	137.687	0.825
2400.000	2.888	138.044	2399.538	-15.103	12.987	-15.103	19.919	139.308	0.635
2500.000	3.015	139.690	2499.405	-18.982	16.373	-18.982	25.067	139.221	0.153
2600.000	2.382	140.946	2599.294	-22.601	19.384	-22.601	29.775	139.383	0.636
2700.000	1.620	143.952	2699.232	-25.358	21.525	-25.358	33.262	139.674	0.769
2800.000	1.855	137.113	2799.186	-27.687	23.458	-27.687	36.288	139.726	0.313
2900.000	1.811	139.875	2899.135	-30.081	25.578	-30.081	39.486	139.625	0.099
3000.000	1.539	139.364	2999.092	-32.308	27.471	-32.308	42.409	139.626	0.272
3100.000	1.624	154.484	3099.055	-34.606	28.956	-34.606	45.122	140.080	0.424
3200.000	1.039	170.906	3199.028	-36.781	29.710	-36.781	47.281	141.070	0.692
3300.000	0.511	193.545	3299.018	-38.110	29.749	-38.110	48.346	142.024	0.601
3400.000	1.124	162.792	3399.008	-39.480	29.935	-39.480	49.545	142.830	0.733
3500.000	1.838	149.137	3498.974	-41.794	31.048	-41.794	52.064	143.392	0.792
3600.000	2.175	143.627	3598.913	-44.699	32.996	-44.699	55.558	143.566	0.388
3700.000	2.168	136.092	3698.841	-47.590	35.433	-47.590	59.332	143.330	0.285
3800.000	2.279	144.832	3798.766	-50.578	37.890	-50.578	63.197	143.161	0.357
3900.000	2.042	145.729	3898.695	-53.676	40.039	-53.676	66.965	143.279	0.240
4000.000	1.545	156.387	3998.646	-56.384	41.582	-56.384	70.059	143.592	0.597
4100.000	1.321	178.609	4098.616	-58.771	42.150	-58.771	72.323	144.352	0.594
4200.000	1.542	200.618	4198.585	-61.183	41.704	-61.183	74.044	145.720	0.588
4300.000	1.661	195.775	4298.546	-63.836	40.836	-63.836	75.781	147.393	0.180
4400.000	1.365	218.277	4398.512	-66.166	39.705	-66.166	77.165	149.033	0.658
4500.000	1.736	252.296	4498.477	-67.561	37.524	-67.561	77.282	150.952	0.974
4600.000	1.299	234.827	4598.442	-68.675	35.154	-68.675	77.150	152.892	0.632
4700.000	0.664	208.162	4698.428	-69.839	33.954	-69.839	77.655	154.072	0.765
4800.000	0.739	128.761	4798.422	-70.753	34.184	-70.753	78.578	154.213	0.898
4900.000	1.078	103.089	4898.410	-71.370	35.603	-71.370	79.757	153.488	0.522
5000.000	1.278	114.808	4998.389	-72.051	37.531	-72.051	81.240	152.485	0.312
5100.000	1.285	122.655	5098.364	-73.124	39.487	-73.124	83.104	151.631	0.176
5200.000	1.491	132.173	5198.335	-74.602	41.396	-74.602	85.318	150.975	0.308
5300.000	1.748	146.993	5298.295	-76.754	43.190	-76.754	88.072	150.633	0.489
5400.000	1.801	148.532	5398.247	-79.374	44.841	-79.374	91.164	150.536	0.072
5500.000	1.540	160.385	5498.205	-81.980	46.113	-81.980	94.059	150.643	0.432
5600.000	1.920	168.058	5598.159	-84.884	46.910	-84.884	96.984	151.073	0.445
5700.000	2.045	162.718	5698.100	-88.227	47.787	-88.227	100.337	151.558	0.223
5800.000	2.269	160.134	5798.029	-91.792	48.990	-91.792	104.047	151.911	0.245

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	2.763	172.558	5897.933	-96.044	49.975	-96.044	108.268	152.511	0.733
6000.000	2.786	159.613	5997.816	-100.712	51.134	-100.712	112.949	153.082	0.626
6100.000	2.402	164.889	6097.714	-105.014	52.527	-105.014	117.418	153.426	0.452
6200.000	3.162	149.052	6197.597	-109.402	54.491	-109.402	122.222	153.523	1.074
6300.000	4.718	146.534	6297.357	-115.198	58.178	-115.198	129.055	153.205	1.565
6400.000	4.672	142.380	6397.022	-121.855	62.931	-121.855	137.146	152.686	0.343
6500.000	4.875	132.113	6496.677	-127.930	68.569	-127.930	145.147	151.809	0.877
6600.000	5.151	141.882	6596.296	-134.310	74.492	-134.310	153.585	150.986	0.896
6700.000	4.992	143.075	6695.905	-141.320	79.876	-141.320	162.331	150.524	0.191
6750.000	5.287	141.311	6745.704	-144.857	82.623	-144.857	166.763	150.300	0.670