



Company/Rig: Noble Energy/VES Crane  
WELL/API#: Herbster PM F 26-15/05-123-13978  
DECLINATION: 8.17 Degrees  
TD AS DRILLED: 7121 Feet  
COUNTY/STATE: Weld/Colorado  
VS-Azi: 0.000 Degrees  
Latitude: 40.36525, Longitude: -104.62857  
Grid North = True North -0.56 degs (NAD 27)  
Grid Correction Applied = -0.56 degs



DEPTH REFERENCE : RKB=GL Elevation= 4645 Feet

DRILLOG GYRO SURVEY CALCULATIONS

Filename: run1-de\_01.ut

Minimum Curvature Method

Report Date/Time: 3/3/2017 / 11:22

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: Geof Davis / Herbster PM F 26-15

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	0.245	145.880	100.000	-0.177	0.120	-0.177	0.214	145.880	0.245
200.000	0.290	154.247	199.999	-0.582	0.350	-0.582	0.679	148.992	0.060
300.000	0.329	168.323	299.997	-1.091	0.518	-1.091	1.208	154.609	0.085
400.000	0.905	164.952	399.991	-2.135	0.781	-2.135	2.273	159.904	0.576
500.000	0.619	172.230	499.982	-3.432	1.059	-3.432	3.592	162.852	0.301
600.000	0.281	160.502	599.979	-4.198	1.214	-4.198	4.370	163.874	0.349
700.000	0.526	169.397	699.976	-4.880	1.380	-4.880	5.071	164.210	0.252
800.000	0.341	159.280	799.973	-5.609	1.570	-5.609	5.825	164.367	0.199
900.000	0.651	164.549	899.970	-6.435	1.826	-6.435	6.689	164.156	0.313
1000.000	0.485	134.016	999.965	-7.277	2.282	-7.277	7.626	162.590	0.339
1100.000	0.559	132.942	1099.961	-7.903	2.943	-7.903	8.433	159.574	0.075
1200.000	0.640	143.142	1199.955	-8.682	3.635	-8.682	9.412	157.281	0.133
1300.000	0.626	142.490	1299.949	-9.562	4.303	-9.562	10.486	155.774	0.015
1400.000	0.733	137.974	1399.942	-10.471	5.064	-10.471	11.631	154.191	0.120
1500.000	0.438	101.959	1499.937	-11.026	5.866	-11.026	12.489	151.985	0.458
1600.000	0.444	92.930	1599.934	-11.125	6.627	-11.125	12.949	149.217	0.070
1700.000	0.527	99.329	1699.930	-11.219	7.468	-11.219	13.477	146.350	0.099
1800.000	0.354	77.305	1799.928	-11.225	8.223	-11.225	13.915	143.776	0.239

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	0.299	100.187	1899.926	-11.204	8.781	-11.204	14.235	141.911	0.140
2000.000	0.069	103.684	1999.925	-11.264	9.097	-11.264	14.479	141.077	0.230
2100.000	0.182	110.476	2099.925	-11.334	9.304	-11.334	14.663	140.619	0.114
2200.000	0.176	98.459	2199.925	-11.412	9.604	-11.412	14.915	139.917	0.038
2300.000	0.431	33.456	2299.923	-11.120	9.963	-11.120	14.931	138.142	0.391
2400.000	0.384	104.342	2399.921	-10.889	10.495	-10.889	15.124	136.057	0.474
2500.000	0.860	58.565	2499.916	-10.581	11.459	-10.581	15.597	132.719	0.653
2600.000	0.316	43.550	2599.910	-9.990	12.289	-9.990	15.838	129.108	0.560
2700.000	0.447	9.831	2699.908	-9.406	12.546	-9.406	15.680	126.859	0.254
2800.000	0.572	355.156	2799.904	-8.524	12.570	-8.524	15.188	124.141	0.180
2900.000	0.827	348.976	2899.897	-7.318	12.390	-7.318	14.390	120.567	0.265
3000.000	0.621	341.463	2999.889	-6.096	12.080	-6.096	13.531	116.778	0.227
3100.000	0.606	347.948	3099.883	-5.066	11.797	-5.066	12.839	113.238	0.071
3200.000	0.557	9.244	3199.878	-4.069	11.765	-4.069	12.449	109.078	0.220
3300.000	0.640	34.579	3299.873	-3.129	12.160	-3.129	12.557	104.431	0.275
3400.000	0.682	344.596	3399.867	-2.096	12.320	-2.096	12.497	99.654	0.560
3500.000	0.753	40.841	3499.860	-1.025	12.591	-1.025	12.633	94.654	0.679
3600.000	0.970	58.993	3599.849	-0.092	13.746	-0.092	13.746	90.384	0.346
3700.000	0.732	76.119	3699.838	0.497	15.091	0.497	15.100	88.114	0.345
3800.000	1.158	47.284	3799.825	1.336	16.454	1.336	16.508	85.358	0.626
3900.000	0.863	37.475	3899.809	2.619	17.655	2.619	17.848	81.561	0.341
4000.000	1.049	44.725	3999.795	3.868	18.758	3.868	19.152	78.350	0.221
4100.000	1.245	85.973	4099.777	4.594	20.486	4.594	20.995	77.360	0.829
4200.000	1.282	112.495	4199.753	4.242	22.604	4.242	22.998	79.370	0.581
4300.000	1.500	90.893	4299.724	3.794	24.946	3.794	25.233	81.352	0.564
4400.000	1.587	107.548	4399.688	3.356	27.576	3.356	27.780	83.061	0.455
4500.000	1.827	99.605	4499.644	2.672	30.469	2.672	30.586	84.987	0.336
4600.000	2.072	102.255	4599.586	2.023	33.807	2.023	33.867	86.576	0.260
4700.000	2.810	111.200	4699.495	0.753	37.859	0.753	37.866	88.861	0.829
4800.000	2.680	115.204	4799.380	-1.130	42.260	-1.130	42.275	91.531	0.232
4900.000	2.876	115.750	4899.263	-3.215	46.635	-3.215	46.746	93.944	0.198
5000.000	2.799	110.669	4999.140	-5.167	51.179	-5.167	51.439	95.765	0.263
5100.000	2.716	109.544	5099.025	-6.821	55.696	-6.821	56.113	96.983	0.099
5200.000	2.124	126.476	5198.936	-8.716	59.420	-8.716	60.056	98.345	0.922
5300.000	2.722	127.682	5298.846	-11.269	62.789	-11.269	63.792	100.175	0.599
5400.000	2.126	135.877	5398.757	-14.052	65.959	-14.052	67.439	102.026	0.688
5500.000	1.931	144.966	5498.694	-16.763	68.218	-16.763	70.247	103.805	0.375
5600.000	1.939	152.779	5598.637	-19.647	69.959	-19.647	72.665	105.687	0.264
5700.000	2.107	126.646	5698.577	-22.249	72.208	-22.249	75.558	107.125	0.929
5800.000	2.081	132.283	5798.511	-24.568	75.027	-24.568	78.947	108.131	0.208

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	2.681	135.193	5898.424	-27.449	78.018	-27.449	82.706	109.383	0.611
6000.000	2.600	114.864	5998.320	-30.062	81.724	-30.062	87.078	110.196	0.935
6100.000	3.155	118.104	6098.193	-32.312	86.209	-32.312	92.066	110.546	0.578
6200.000	3.085	118.929	6198.045	-34.910	90.992	-34.910	97.459	110.990	0.083
6300.000	2.988	117.310	6297.905	-37.408	95.663	-37.408	102.717	111.357	0.130
6400.000	3.264	127.203	6397.757	-40.325	100.247	-40.325	108.053	111.913	0.605
6500.000	3.190	132.606	6497.598	-43.930	104.562	-43.930	113.416	112.789	0.313
6600.000	2.777	130.990	6597.462	-47.402	108.439	-47.402	118.347	113.612	0.422
6650.000	3.027	131.802	6647.398	-49.076	110.337	-49.076	120.759	113.979	0.507