

Company: NOBLE ENERGY

Well: BROWN USX AA 3-17

API: 05-123-24608

Rig Name: PRODUCTIONLIGHTNING

State/County: COLORADO/WELD

Latitude: 40.519, Longitude: -104.418

GRID North is 0.700 Degrees East of True North

VS-Azi: 0.000 Degrees

**FIELD COPY ONLY (NOT DEFINITIVE)**

Depth Reference : RKB = GROUND LEVEL

**DRILLOG MS GYRO SURVEY CALCULATIONS**

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

Minimum Curvature Method

Report Date/Time: 11/28/2012 / 13:00

VAUGHN ENERGY SERVICES

HENDERSON, COLORADO

866-835-8333

NICK KULA

DEPTH REFERENCE=GROUND LEVEL

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	0.306	160.291	100.000	-0.252	0.090	-0.252	0.267	160.291	0.306
200.000	0.089	149.299	199.999	-0.570	0.220	-0.570	0.611	158.898	0.219
300.000	0.075	95.716	299.999	-0.644	0.325	-0.644	0.721	153.192	0.075
400.000	0.181	189.939	399.999	-0.806	0.363	-0.806	0.884	155.722	0.201
500.000	0.153	15.096	499.998	-0.832	0.371	-0.832	0.911	155.967	0.334
600.000	0.418	213.606	599.998	-1.006	0.204	-1.006	1.027	168.535	0.565
700.000	0.381	185.162	699.995	-1.641	-0.028	-1.641	1.641	180.962	0.199
800.000	0.391	186.504	799.993	-2.312	-0.096	-2.312	2.314	182.382	0.014
900.000	0.418	217.612	899.991	-2.940	-0.358	-2.940	2.962	186.935	0.219
1000.000	0.952	211.839	999.983	-3.935	-1.018	-3.935	4.064	194.512	0.537
1100.000	0.977	219.683	1099.969	-5.297	-2.001	-5.297	5.662	200.698	0.134
1200.000	1.586	234.017	1199.944	-6.766	-3.666	-6.766	7.696	208.448	0.684
1300.000	1.795	243.754	1299.901	-8.272	-6.191	-8.272	10.332	216.810	0.355
1400.000	2.436	256.426	1399.832	-9.464	-9.662	-9.464	13.525	225.593	0.790
1500.000	2.942	257.232	1499.722	-10.530	-14.231	-10.530	17.703	233.501	0.507
1600.000	3.117	244.073	1599.583	-12.286	-19.178	-12.286	22.776	237.356	0.715
1700.000	3.034	250.210	1699.440	-14.370	-24.113	-14.370	28.070	239.207	0.339
1800.000	2.952	250.858	1799.303	-16.110	-29.035	-16.110	33.205	240.976	0.089
1900.000	2.833	255.736	1899.176	-17.563	-33.862	-17.563	38.146	242.586	0.273
2000.000	3.036	260.673	1999.045	-18.601	-38.871	-18.601	43.092	244.427	0.324
2100.000	2.927	257.806	2098.910	-19.570	-43.979	-19.570	48.137	246.012	0.184
2200.000	2.391	272.206	2198.803	-20.029	-48.559	-20.029	52.528	247.586	0.853
2300.000	2.149	287.766	2298.725	-19.377	-52.429	-19.377	55.895	249.717	0.659
2400.000	2.245	285.362	2398.652	-18.285	-56.103	-18.285	59.008	251.948	0.133
2500.000	2.624	297.017	2498.562	-16.727	-60.032	-16.727	62.318	254.430	0.621
2600.000	2.571	298.163	2598.459	-14.628	-64.048	-14.628	65.697	257.134	0.074
2700.000	2.213	309.496	2698.372	-12.342	-67.515	-12.342	68.634	259.640	0.591
2800.000	2.238	304.710	2798.297	-10.002	-70.610	-10.002	71.315	261.937	0.187
2900.000	2.488	301.239	2898.212	-7.765	-74.071	-7.765	74.477	264.016	0.288

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
3000.000	2.377	307.892	2998.122	-5.365	-77.564	-5.365	77.749	266.043	0.303
3100.000	2.091	312.045	3098.046	-2.870	-80.555	-2.870	80.606	267.960	0.329
3200.000	1.732	317.822	3197.990	-0.528	-82.924	-0.528	82.926	269.635	0.407
3300.000	1.437	321.092	3297.952	1.568	-84.727	1.568	84.741	271.060	0.308
3400.000	0.966	284.321	3397.931	2.752	-86.331	2.752	86.375	271.826	0.880
3500.000	0.719	283.338	3497.920	3.105	-87.758	3.105	87.813	272.027	0.247
3600.000	0.960	302.724	3597.910	3.703	-89.073	3.703	89.150	272.380	0.369
3700.000	0.524	318.606	3697.901	4.498	-90.080	4.498	90.192	272.859	0.478
3800.000	0.485	291.543	3797.897	4.997	-90.776	4.997	90.914	273.151	0.239
3900.000	0.345	303.268	3897.895	5.317	-91.422	5.317	91.576	273.329	0.164
4000.000	0.711	306.911	3997.890	5.855	-92.169	5.855	92.355	273.635	0.368
4100.000	0.456	319.038	4097.885	6.529	-92.927	6.529	93.156	274.019	0.282
4200.000	0.657	287.063	4197.881	6.998	-93.736	6.998	93.997	274.269	0.362
4300.000	1.419	277.912	4297.863	7.336	-95.510	7.336	95.791	274.392	0.777
4400.000	1.895	289.805	4397.822	8.067	-98.292	8.067	98.622	274.692	0.585
4500.000	2.728	287.777	4497.739	9.354	-102.113	9.354	102.541	275.234	0.837
4600.000	1.793	280.256	4597.661	10.359	-105.919	10.359	106.425	275.586	0.979
4700.000	1.768	256.782	4697.614	10.285	-108.960	10.285	109.445	275.392	0.725
4800.000	1.710	244.716	4797.568	9.295	-111.811	9.295	112.197	274.752	0.370
4900.000	1.443	261.661	4897.531	8.475	-114.406	8.475	114.719	274.237	0.534
5000.000	1.463	258.969	4997.498	8.048	-116.905	8.048	117.181	273.938	0.071
5100.000	0.900	284.010	5097.477	7.994	-118.919	7.994	119.187	273.846	0.751
5200.000	0.085	159.783	5197.474	8.114	-119.655	8.114	119.930	273.879	0.950
5300.000	0.597	100.381	5297.472	7.950	-119.117	7.950	119.382	273.819	0.558
5400.000	1.012	78.676	5397.462	8.030	-117.738	8.030	118.012	273.902	0.508
5500.000	0.907	65.712	5497.448	8.529	-116.152	8.529	116.464	274.200	0.241
5600.000	0.856	111.931	5597.437	8.575	-114.737	8.575	115.057	274.274	0.693
5700.000	1.079	65.792	5697.424	8.682	-113.185	8.682	113.518	274.386	0.785
5800.000	0.693	115.803	5797.413	8.805	-111.782	8.805	112.129	274.504	0.827
5900.000	0.866	83.046	5897.405	8.633	-110.488	8.633	110.825	274.468	0.470
6000.000	0.632	66.140	5997.396	8.948	-109.234	8.948	109.600	274.683	0.320
6100.000	0.608	60.485	6097.390	9.432	-108.268	9.432	108.678	274.979	0.065
6200.000	0.700	53.549	6197.384	10.057	-107.314	10.057	107.784	275.354	0.121
6300.000	0.355	42.405	6297.379	10.649	-106.613	10.649	107.144	275.704	0.359
6400.000	0.426	91.015	6397.377	10.871	-106.033	10.871	106.589	275.854	0.328
6500.000	0.324	54.934	6497.375	11.027	-105.430	11.027	106.005	275.971	0.251
6600.000	0.874	33.059	6597.370	11.830	-104.782	11.830	105.448	276.441	0.586
6700.000	1.318	52.898	6697.351	13.163	-103.448	13.163	104.282	277.251	0.578

HORIZONTAL DISPLACEMENT IS 104.282 FEET AT 277.251 DEGREES									
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