

Company/Rig: NOBLE ENERGY/PRODUCTION
WELL/API#: WILLIAMS PM F # 15-8/05-123-14056
DECLINATION: 8.33
TD AS DRILLED: 7130 FEET
COUNTY/STATE: WELD/COLORADO
VS-Azi: 0.000 Degrees
Latitude: 40.40073, Longitude: -104.64193
Grid Convergence Applied = -0.56 degs
Grid North = True North -0.56 degs



FIELD COPY ONLY (NOT DEFINITIVE)

DEPTH REFERENCE : RKB=SURFACE ELEVATION=4624'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01.ut
Minimum Curvature Method
Report Date/Time: 8/18/2015 / 15:25

LAT/LONG/MEASURED TD OBTAINED BY STATE WEBSITE
NORTH REFERENCE: GRID
HENDERSON, COLORADO
303-853-4976

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	0.382	187.877	99.999	-0.331	-0.046	-0.331	0.334	187.877	0.382
200.000	0.471	206.576	199.997	-1.029	-0.275	-1.029	1.065	194.986	0.164
300.000	0.802	203.932	299.990	-2.037	-0.743	-2.037	2.168	200.053	0.332
400.000	0.735	193.969	399.981	-3.299	-1.182	-3.299	3.504	199.716	0.149
500.000	0.461	197.932	499.976	-4.304	-1.461	-4.304	4.545	198.749	0.277
600.000	0.634	202.347	599.971	-5.198	-1.795	-5.198	5.499	199.051	0.178
700.000	0.767	203.905	699.964	-6.321	-2.276	-6.321	6.719	199.805	0.134
800.000	0.275	198.459	799.959	-7.160	-2.623	-7.160	7.625	200.122	0.494
900.000	0.506	197.307	899.957	-7.809	-2.831	-7.809	8.306	199.924	0.232
1000.000	0.310	180.176	999.954	-8.501	-2.963	-8.501	9.002	199.215	0.229
1100.000	0.160	158.714	1099.953	-8.901	-2.913	-8.901	9.365	198.121	0.171
1200.000	0.268	156.162	1199.953	-9.245	-2.768	-9.245	9.650	196.666	0.109
1300.000	0.168	157.597	1299.952	-9.595	-2.617	-9.595	9.945	195.257	0.100
1400.000	0.182	163.219	1399.951	-9.882	-2.515	-9.882	10.197	194.280	0.022
1500.000	0.428	174.398	1499.950	-10.406	-2.433	-10.406	10.687	193.160	0.252
1600.000	0.304	169.326	1599.948	-11.038	-2.348	-11.038	11.285	192.006	0.128
1700.000	0.306	159.182	1699.947	-11.548	-2.204	-11.548	11.757	190.803	0.054
1800.000	0.368	146.308	1799.945	-12.065	-1.931	-12.065	12.218	189.092	0.097
1900.000	0.289	147.123	1899.943	-12.543	-1.616	-12.543	12.647	187.341	0.079
2000.000	0.444	158.458	1999.941	-13.116	-1.337	-13.116	13.184	185.820	0.171
2100.000	0.568	182.726	2099.937	-13.971	-1.218	-13.971	14.024	184.983	0.245
2200.000	0.291	193.142	2199.934	-14.713	-1.299	-14.713	14.770	185.047	0.287
2300.000	0.374	184.996	2299.933	-15.285	-1.385	-15.285	15.348	185.179	0.096
2400.000	0.437	173.148	2399.930	-15.990	-1.368	-15.990	16.048	184.891	0.104
2500.000	0.360	161.099	2499.928	-16.665	-1.221	-16.665	16.710	184.191	0.113
2600.000	0.229	178.928	2599.927	-17.162	-1.116	-17.162	17.198	183.719	0.159
2700.000	0.273	187.494	2699.926	-17.597	-1.143	-17.597	17.634	183.716	0.058
2800.000	0.387	190.037	2799.924	-18.166	-1.233	-18.166	18.207	183.882	0.115
2900.000	0.310	168.895	2899.922	-18.764	-1.239	-18.764	18.805	183.779	0.148
3000.000	0.243	166.531	2999.921	-19.236	-1.138	-19.236	19.270	183.385	0.068
3100.000	0.330	164.294	3099.920	-19.719	-1.011	-19.719	19.745	182.934	0.087
3200.000	0.461	122.137	3199.917	-20.210	-0.592	-20.210	20.219	181.678	0.310
3300.000	0.689	123.511	3299.912	-20.756	0.250	-20.756	20.758	179.310	0.228
3400.000	0.751	105.089	3399.905	-21.258	1.383	-21.258	21.303	176.277	0.238

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
3500.000	1.388	108.053	3499.887	-21.804	3.167	-21.804	22.033	171.736	0.639
3600.000	1.425	106.726	3599.857	-22.537	5.509	-22.537	23.201	166.263	0.050
3700.000	1.276	103.596	3699.829	-23.157	7.783	-23.157	24.430	161.423	0.167
3800.000	1.562	109.495	3799.798	-23.874	10.150	-23.874	25.942	156.967	0.321
3900.000	1.415	95.018	3899.765	-24.437	12.665	-24.437	27.524	152.603	0.403
4000.000	1.039	84.281	3999.742	-24.454	14.797	-24.454	28.583	148.822	0.439
4100.000	1.335	88.522	4099.720	-24.334	16.864	-24.334	29.606	145.277	0.309
4200.000	1.264	83.821	4199.694	-24.185	19.125	-24.185	30.833	141.664	0.128
4300.000	2.043	88.800	4299.652	-24.029	22.003	-24.029	32.581	137.520	0.792
4400.000	1.969	86.475	4399.591	-23.886	25.500	-23.886	34.940	133.129	0.110
4500.000	2.406	80.093	4499.518	-23.419	29.281	-23.419	37.495	128.653	0.500
4600.000	2.447	87.712	4599.428	-22.973	33.482	-22.973	40.606	124.455	0.325
4700.000	2.450	93.124	4699.337	-23.004	37.749	-23.004	44.206	121.358	0.231
4800.000	2.422	101.988	4799.247	-23.560	41.950	-23.560	48.113	119.319	0.377
4900.000	2.643	108.424	4899.150	-24.728	46.205	-24.728	52.406	118.154	0.360
5000.000	2.343	122.229	4999.056	-26.546	50.122	-26.546	56.718	117.907	0.669
5100.000	2.318	128.827	5098.973	-28.904	53.426	-28.904	60.744	118.414	0.269
5200.000	2.402	144.736	5198.890	-31.883	56.211	-31.883	64.623	119.562	0.658
5300.000	2.121	163.002	5298.813	-35.363	57.962	-35.363	67.898	121.388	0.769
5400.000	2.210	173.738	5398.742	-39.050	58.713	-39.050	70.513	123.628	0.415
5500.000	2.306	183.507	5498.665	-42.974	58.800	-42.974	72.830	126.161	0.396
5600.000	2.300	194.203	5598.584	-46.927	58.185	-46.927	74.751	128.887	0.429
5700.000	2.724	213.902	5698.490	-50.845	56.367	-50.845	75.911	132.051	0.956
5800.000	2.336	222.620	5798.393	-54.317	53.662	-54.317	76.354	135.348	0.546
5900.000	1.937	242.901	5898.324	-56.586	50.777	-56.586	76.029	138.097	0.848
6000.000	1.898	257.167	5998.269	-57.724	47.658	-57.724	74.855	140.457	0.478
6100.000	1.707	268.988	6098.220	-58.118	44.554	-58.118	73.231	142.526	0.417
6200.000	1.546	279.011	6198.180	-57.933	41.732	-57.933	71.399	144.233	0.326
6300.000	1.224	301.486	6298.151	-57.165	39.490	-57.165	69.478	145.363	0.625
6400.000	0.800	330.056	6398.136	-56.002	38.231	-56.002	67.807	145.680	0.647
6500.000	0.606	351.347	6498.128	-54.875	37.803	-54.875	66.635	145.437	0.322
6600.000	0.548	19.432	6598.123	-53.901	37.882	-53.901	65.882	144.900	0.285
6700.000	0.674	38.055	6698.118	-52.988	38.403	-52.988	65.441	144.067	0.234
6800.000	0.605	58.017	6798.112	-52.245	39.214	-52.245	65.324	143.109	0.232
6900.000	0.672	57.878	6898.106	-51.654	40.158	-51.654	65.428	142.137	0.067

<div> HORIZONTAL DISPLACEMENT IS 65.428 FEET AT 142.137 DEGREES </div>
