



**Company:** Noble Energy  
**Rig:** Production/ V.E.S  
**API #** 05-123-26825  
**Date:** 1/3/2014  
**Surveyor:** Jay Hinman  
**VS:** 0.000  
**Lat :** 40.196383  
**Long:** -104.654475

**Well:** Ritchey H27-20  
**Location:** Weld County, Colorado  
**North Reference:** GRID  
**Convergence:** Grid North is 0.55 Deg  
**Declination:** 8.44  
**Depth Reference:** Ground Level  
**Elevation:** 4818'  
**Total Depth as Drilled:** 7291'

**Lat & Long obtained by handheld GPS at wellhead**

HA Gyro Survey Calculations

Depth	Inc	AzG	N/-S	E/-W	TVD	DL	VS	CD
0.000	0.000	0.000	0.000	0.000	0.000	****	0.000	0.000
100.000	0.654	286.390	0.161	-0.547	99.998	0.654	0.161	0.571
200.000	0.857	257.266	0.157	-1.825	199.989	0.428	0.157	1.831
300.000	0.564	236.439	-0.280	-2.964	299.982	0.386	-0.280	2.978
400.000	0.638	263.186	-0.618	-3.927	399.976	0.287	-0.618	3.976
500.000	0.635	234.079	-1.009	-4.929	499.971	0.320	-1.009	5.031
600.000	1.106	217.259	-2.102	-5.962	599.959	0.531	-2.102	6.322
700.000	1.047	232.946	-3.421	-7.276	699.941	0.300	-3.421	8.040
800.000	1.023	230.499	-4.540	-8.694	799.925	0.050	-4.540	9.808
900.000	1.121	230.971	-5.724	-10.143	899.908	0.098	-5.724	11.646
1000.000	1.216	224.712	-7.094	-11.649	999.887	0.159	-7.094	13.639
1100.000	1.296	223.026	-8.675	-13.167	1099.863	0.088	-8.675	15.768
1200.000	1.555	225.022	-10.461	-14.899	1199.832	0.264	-10.461	18.205
1300.000	1.587	227.839	-12.350	-16.886	1299.794	0.083	-12.350	20.920
1400.000	1.692	229.468	-14.239	-19.034	1399.753	0.115	-14.239	23.771
1500.000	2.024	231.307	-16.302	-21.535	1499.701	0.337	-16.302	27.010
1600.000	2.111	230.798	-18.571	-24.341	1599.635	0.089	-18.571	30.616
1700.000	2.442	235.775	-20.933	-27.530	1699.556	0.385	-20.933	34.585
1800.000	2.477	240.378	-23.199	-31.170	1799.464	0.200	-23.199	38.856
1900.000	2.186	240.862	-25.196	-34.713	1899.382	0.292	-25.196	42.893
2000.000	2.386	245.553	-26.986	-38.273	1999.302	0.274	-26.986	46.830
2100.000	2.176	242.272	-28.730	-41.849	2099.223	0.246	-28.730	50.762
2200.000	2.423	256.040	-30.124	-45.581	2199.143	0.603	-30.124	54.636
2300.000	2.299	245.169	-31.476	-49.452	2299.059	0.464	-31.476	58.620
2400.000	2.462	252.402	-32.967	-53.320	2398.972	0.341	-32.967	62.688
2500.000	2.514	239.869	-34.718	-57.264	2498.879	0.546	-34.718	66.966
2600.000	2.546	248.920	-36.618	-61.234	2598.782	0.400	-36.618	71.347
2700.000	2.789	238.370	-38.693	-65.378	2698.674	0.546	-38.693	75.970
2800.000	3.135	238.769	-41.386	-69.787	2798.540	0.347	-41.386	81.136
2900.000	3.343	251.329	-43.737	-74.887	2898.382	0.738	-43.737	86.724
3000.000	3.699	257.744	-45.355	-80.802	2998.193	0.530	-45.355	92.661
3100.000	3.939	261.046	-46.575	-87.347	3097.971	0.325	-46.575	98.988
3200.000	4.078	263.843	-47.491	-94.275	3197.727	0.240	-47.491	105.561
3300.000	4.403	263.647	-48.297	-101.625	3297.453	0.325	-48.297	112.518
3400.000	4.007	261.175	-49.258	-108.893	3397.184	0.435	-49.258	119.515
3500.000	4.048	263.431	-50.197	-115.851	3496.937	0.164	-50.197	126.259

3600.000	4.137	263.655	-51.000	-122.942	3596.682	0.090	-51.000	133.100
3700.000	4.239	276.108	-51.005	-130.201	3696.417	0.913	-51.005	139.835
3800.000	4.788	266.845	-50.842	-138.044	3796.108	0.911	-50.842	147.109
3900.000	5.304	272.769	-50.848	-146.828	3895.720	0.732	-50.848	155.383
4000.000	5.784	281.830	-49.592	-156.376	3995.254	0.997	-49.592	164.051
4100.000	6.030	275.279	-48.076	-166.538	4094.724	0.717	-48.076	173.338
4200.000	6.453	273.591	-47.240	-177.377	4194.131	0.462	-47.240	183.560
4300.000	6.213	271.403	-46.756	-188.395	4293.521	0.341	-46.756	194.111
4400.000	5.345	271.678	-46.487	-198.461	4393.012	0.869	-46.487	203.833
4500.000	4.907	276.263	-45.884	-207.368	4492.612	0.599	-45.884	212.383
4600.000	4.375	271.471	-45.319	-215.432	4592.284	0.658	-45.319	220.148
4700.000	4.090	279.945	-44.606	-222.758	4692.013	0.687	-44.606	227.180
4800.000	4.598	282.990	-43.089	-230.176	4791.725	0.558	-43.089	234.175
4900.000	4.729	290.861	-40.720	-237.934	4891.395	0.653	-40.720	241.393
5000.000	5.134	286.068	-38.014	-246.086	4991.025	0.578	-38.014	249.004
5100.000	4.735	293.893	-35.103	-254.160	5090.655	0.782	-35.103	256.572
5200.000	4.380	284.029	-32.506	-261.638	5190.341	0.859	-32.506	263.650
5300.000	3.771	291.871	-30.355	-268.395	5290.088	0.824	-30.355	270.106
5400.000	3.404	295.602	-27.847	-274.124	5389.892	0.435	-27.847	275.535
5500.000	3.083	299.525	-25.239	-279.142	5489.732	0.390	-25.239	280.281
5600.000	2.582	294.950	-22.963	-283.524	5589.609	0.550	-22.963	284.452
5700.000	2.387	274.064	-21.866	-287.643	5689.517	0.920	-21.866	288.473
5800.000	2.244	289.086	-21.078	-291.570	5789.437	0.621	-21.078	292.331
5900.000	2.451	280.515	-20.047	-295.523	5889.353	0.407	-20.047	296.203
6000.000	2.763	287.138	-18.947	-299.930	5989.250	0.433	-18.947	300.528
6100.000	3.042	286.191	-17.497	-304.781	6089.121	0.282	-17.497	305.283
6200.000	3.338	294.628	-15.544	-309.975	6188.967	0.554	-15.544	310.365
6300.000	3.775	284.878	-13.485	-315.803	6288.775	0.745	-13.485	316.091
6400.000	3.597	281.692	-12.004	-322.056	6388.568	0.271	-12.004	322.280
6500.000	3.510	283.958	-10.630	-328.098	6488.376	0.165	-10.630	328.270
6600.000	3.206	283.015	-9.262	-333.794	6588.204	0.309	-9.262	333.922
6700.000	3.765	278.849	-8.128	-339.762	6688.019	0.613	-8.128	339.859
6800.000	4.458	281.948	-6.818	-346.809	6787.761	0.728	-6.818	346.876
6900.000	4.583	280.751	-5.268	-354.536	6887.450	0.157	-5.268	354.576
7000.000	4.571	290.442	-3.131	-362.196	6987.132	0.773	-3.131	362.209
7050.000	4.826	286.549	-1.836	-366.079	7036.964	0.816	-1.836	366.084

0

rees East of True North

**Cbrg**

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286.390  
274.923  
264.608  
261.058  
258.430  
250.576  
244.815  
242.427  
240.563  
238.660  
236.623  
234.927  
233.819  
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