



Company: PDC Energy  
Well: Buffalo Gardens 41-13  
API: 05-123-19608  
Rig Name: Production/ VES  
State/County: Colorado/Weld  
Latitude: 40.145, Longitude: -104.944  
Directions are relative to True North  
VS-Azi: 0.000 Degrees



**FIELD COPY ONLY (NOT DEFINITIVE)**

Depth Reference : RKB= Ground Level

**DRILLOG HA GYRO SURVEY CALCULATIONS**

Filename: hgyro.ut  
Minimum Curvature Method  
Report Date/Time: 10/24/2014 / 09:53

Vaughn Survey International  
Henderson, CO 80640  
303-853-4976  
Sean Bratt

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	0.418	244.741	99.999	-0.156	-0.330	-0.156	0.365	244.741	0.418
200.000	0.479	208.600	199.996	-0.678	-0.860	-0.678	1.095	231.721	0.284
300.000	0.609	215.286	299.992	-1.479	-1.367	-1.479	2.014	222.735	0.144
400.000	0.698	227.923	399.985	-2.321	-2.126	-2.321	3.147	222.483	0.169
500.000	0.674	219.072	499.978	-3.185	-2.948	-3.185	4.340	222.784	0.108
600.000	0.720	230.827	599.971	-4.039	-3.806	-4.039	5.549	223.298	0.150
700.000	1.047	244.894	699.959	-4.823	-5.120	-4.823	7.034	226.709	0.390
800.000	0.978	260.136	799.943	-5.357	-6.787	-5.357	8.646	231.718	0.277
900.000	0.870	247.899	899.931	-5.788	-8.331	-5.788	10.144	235.208	0.224
1000.000	1.059	249.549	999.916	-6.397	-9.900	-6.397	11.786	237.131	0.191
1100.000	1.087	251.720	1099.899	-7.017	-11.666	-7.017	13.614	238.973	0.049
1200.000	1.150	244.642	1199.880	-7.744	-13.473	-7.744	15.541	240.110	0.152
1300.000	1.034	260.610	1299.862	-8.321	-15.271	-8.321	17.391	241.413	0.324
1400.000	1.171	247.125	1399.843	-8.866	-17.103	-8.866	19.265	242.599	0.292
1500.000	0.832	245.817	1499.828	-9.561	-18.708	-9.561	21.009	242.930	0.340
1600.000	0.754	242.763	1599.818	-10.160	-19.955	-10.160	22.393	243.019	0.089
1700.000	0.894	231.653	1699.808	-10.945	-21.152	-10.945	23.816	242.642	0.212
1800.000	0.875	231.884	1799.796	-11.900	-22.365	-11.900	25.334	241.983	0.019
1900.000	1.028	208.844	1899.783	-13.157	-23.398	-13.157	26.844	240.650	0.409
2000.000	1.036	193.615	1999.767	-14.822	-24.044	-14.822	28.245	238.349	0.274
2100.000	1.291	191.982	2099.746	-16.802	-24.491	-16.802	29.700	235.547	0.257
2200.000	1.221	199.688	2199.722	-18.907	-25.083	-18.907	31.411	232.992	0.183
2300.000	0.959	247.615	2299.706	-20.228	-26.216	-20.228	33.113	232.346	0.917
2400.000	1.017	263.633	2399.691	-20.646	-27.872	-20.646	34.685	233.472	0.281
2500.000	0.772	261.412	2499.679	-20.845	-29.421	-20.845	36.056	234.682	0.247
2600.000	0.937	263.070	2599.668	-21.044	-30.899	-21.044	37.385	235.743	0.167
2700.000	0.320	299.619	2699.662	-21.005	-31.954	-21.005	38.239	236.682	0.706
2800.000	0.070	301.411	2799.661	-20.834	-32.250	-20.834	38.394	237.136	0.250
2900.000	0.398	115.071	2899.660	-20.949	-31.988	-20.949	38.237	236.778	0.468
3000.000	0.677	184.070	2999.657	-21.686	-31.715	-21.686	38.420	235.637	0.651
3100.000	0.488	211.518	3099.652	-22.638	-31.980	-22.638	39.182	234.706	0.332
3200.000	0.879	218.236	3199.644	-23.604	-32.677	-23.604	40.311	234.158	0.398
3300.000	1.527	200.204	3299.622	-25.457	-33.612	-25.457	42.164	232.861	0.742
3400.000	1.958	202.053	3399.576	-28.290	-34.714	-28.290	44.781	230.822	0.435
3500.000	2.497	208.114	3499.500	-31.794	-36.381	-31.794	48.316	228.849	0.587

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
3600.000	2.089	228.518	3599.421	-34.923	-38.773	-34.923	52.182	227.991	0.906
3700.000	1.136	238.212	3699.381	-36.652	-40.982	-36.652	54.981	228.192	0.988
3800.000	1.375	279.546	3799.358	-36.976	-43.008	-36.976	56.718	229.313	0.914
3900.000	1.646	288.601	3899.324	-36.319	-45.552	-36.319	58.259	231.435	0.361
4000.000	1.858	291.858	3999.277	-35.257	-48.418	-35.257	59.895	233.939	0.234
4100.000	1.623	307.171	4099.231	-33.798	-51.051	-33.798	61.225	236.494	0.519
4200.000	1.641	306.778	4199.191	-32.085	-53.327	-32.085	62.235	238.966	0.021
4300.000	1.682	322.270	4299.149	-30.067	-55.371	-30.067	63.008	241.498	0.450
4400.000	1.579	318.137	4399.109	-27.881	-57.189	-27.881	63.623	244.010	0.156
4500.000	1.624	327.979	4499.070	-25.653	-58.859	-25.653	64.207	246.450	0.278
4600.000	2.025	313.688	4599.020	-23.232	-60.888	-23.232	65.169	249.115	0.604
4700.000	2.009	328.982	4698.958	-20.509	-63.069	-20.509	66.320	251.986	0.537
4800.000	2.440	319.066	4798.883	-17.399	-65.367	-17.399	67.643	255.095	0.576
4900.000	2.286	310.113	4898.798	-14.505	-68.287	-14.505	69.811	258.008	0.399
5000.000	2.264	295.549	4998.720	-12.368	-71.595	-12.368	72.655	260.199	0.577
5100.000	1.714	289.360	5098.660	-11.021	-74.788	-11.021	75.595	261.617	0.589
5200.000	1.427	287.398	5198.622	-10.153	-77.387	-10.153	78.050	262.526	0.292
5300.000	1.186	278.841	5298.596	-9.621	-79.598	-9.621	80.178	263.108	0.309
5400.000	0.928	278.106	5398.579	-9.348	-81.423	-9.348	81.958	263.451	0.259
5500.000	0.663	301.044	5498.570	-8.935	-82.720	-8.935	83.201	263.835	0.409
5600.000	0.738	318.540	5598.562	-8.155	-83.642	-8.155	84.038	264.432	0.225
5700.000	0.656	337.318	5698.555	-7.144	-84.289	-7.144	84.591	265.155	0.241
5800.000	0.917	314.047	5798.546	-6.059	-85.085	-6.059	85.300	265.926	0.408
5900.000	1.053	281.371	5898.532	-5.322	-86.561	-5.322	86.724	266.482	0.569
6000.000	0.295	258.401	5998.524	-5.192	-87.713	-5.192	87.867	266.612	0.790
6100.000	0.227	204.043	6098.523	-5.425	-88.046	-5.425	88.213	266.474	0.246
6200.000	0.181	186.721	6198.523	-5.763	-88.145	-5.763	88.334	266.259	0.076
6300.000	0.216	306.174	6298.522	-5.809	-88.316	-5.809	88.507	266.237	0.343
6400.000	0.529	221.104	6398.521	-6.046	-88.772	-6.046	88.978	266.104	0.554
6500.000	0.342	296.352	6498.518	-6.262	-89.343	-6.262	89.562	265.991	0.552
6600.000	0.455	332.686	6598.516	-5.777	-89.792	-5.777	89.978	266.319	0.271
6700.000	0.367	289.293	6698.514	-5.318	-90.277	-5.318	90.433	266.629	0.315
6800.000	0.242	216.380	6798.513	-5.382	-90.704	-5.382	90.864	266.604	0.376
6900.000	0.538	314.585	6898.511	-5.223	-91.164	-5.223	91.314	266.721	0.621
7000.000	0.082	249.133	6998.509	-4.919	-91.565	-4.919	91.697	266.925	0.510
7100.000	0.393	264.147	7098.508	-4.979	-91.973	-4.979	92.108	266.901	0.315
7200.000	0.152	93.527	7198.508	-5.022	-92.182	-5.022	92.318	266.882	0.543
7300.000	0.290	4.712	7298.507	-4.778	-92.029	-4.778	92.153	267.028	0.324
7400.000	0.697	46.953	7398.504	-4.111	-91.563	-4.111	91.656	267.429	0.520
7500.000	0.327	41.381	7498.499	-3.482	-90.930	-3.482	90.997	267.807	0.373
7600.000	0.820	60.368	7598.494	-2.914	-90.120	-2.914	90.167	268.148	0.522
7700.000	0.818	111.995	7698.485	-2.827	-88.836	-2.827	88.881	268.177	0.713
7800.000	0.570	92.718	7798.478	-3.118	-87.677	-3.118	87.733	267.963	0.337
HORIZONTAL DISPLACEMENT IS 87.733 FEET AT 267.963 DEGREES									