



Company: PDC ENERGY  
Lease/Well: CASS/ #5  
A.P.I.#: 05-123-23951  
Rig Name: PRODUCTION/ V.E.S.  
State/County: COLORADO/WELD  
Latitude: 40.403, Longitude: -104.626  
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: cass#5-de\_01.ut  
Minimum Curvature Method  
Report Date/Time: 11/11/2014 / 21:14

VES Survey International  
Pinedale, Wyoming  
866-835-8333  
Jay Hinman  
Cass #5

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	0.349	73.263	99.999	0.088	0.291	0.088	0.304	73.263	0.349
200.000	0.219	183.134	199.999	-0.015	0.572	-0.015	0.573	91.543	0.471
300.000	0.389	126.443	299.997	-0.408	0.835	-0.408	0.929	116.028	0.325
400.000	0.342	141.485	399.995	-0.843	1.294	-0.843	1.544	123.079	0.107
500.000	0.412	124.862	499.993	-1.282	1.775	-1.282	2.189	125.837	0.129
600.000	0.389	86.823	599.991	-1.468	2.408	-1.468	2.821	121.373	0.262
700.000	0.199	321.407	699.990	-1.314	2.639	-1.314	2.948	116.472	0.529
800.000	0.267	7.568	799.989	-0.948	2.561	-0.948	2.730	110.305	0.193
900.000	0.267	0.941	899.988	-0.484	2.595	-0.484	2.640	100.565	0.031
1000.000	0.197	94.319	999.988	-0.264	2.771	-0.264	2.783	95.446	0.341
1100.000	0.491	54.229	1099.986	-0.027	3.290	-0.027	3.290	90.464	0.363
1200.000	0.430	41.714	1199.983	0.504	3.888	0.504	3.920	82.610	0.117
1300.000	0.205	342.491	1299.981	0.955	4.084	0.955	4.194	76.834	0.370
1400.000	0.321	156.907	1399.981	0.869	4.140	0.869	4.230	78.150	0.525
1500.000	0.155	54.883	1499.980	0.689	4.360	0.689	4.414	81.019	0.384
1600.000	0.215	96.637	1599.980	0.745	4.657	0.745	4.717	80.908	0.143
1700.000	0.281	323.507	1699.980	0.921	4.698	0.921	4.787	78.908	0.456
1800.000	0.745	315.873	1799.975	1.585	4.099	1.585	4.395	68.862	0.468
1900.000	1.429	320.661	1899.957	3.016	2.856	3.016	4.154	43.448	0.689
2000.000	1.316	308.894	1999.928	4.701	1.173	4.701	4.845	14.007	0.303
2100.000	1.732	312.650	2099.893	6.446	-0.833	6.446	6.499	352.638	0.428
2200.000	1.076	311.878	2199.862	8.097	-2.644	8.097	8.517	341.917	0.656
2300.000	0.175	264.513	2299.855	8.709	-3.494	8.709	9.384	338.137	0.966
2400.000	0.467	337.120	2399.854	9.070	-3.804	9.070	9.835	337.243	0.447
2500.000	0.592	306.359	2499.850	9.751	-4.379	9.751	10.689	335.817	0.306
2600.000	0.233	347.726	2599.847	10.256	-4.838	10.256	11.340	334.745	0.445
2700.000	0.171	326.872	2699.847	10.580	-4.963	10.580	11.686	334.868	0.095
2800.000	0.519	296.391	2799.845	10.906	-5.450	10.906	12.192	333.447	0.382
2900.000	0.653	292.752	2899.840	11.328	-6.382	11.328	13.002	330.604	0.140
3000.000	0.893	274.689	2999.831	11.612	-7.685	11.612	13.925	326.504	0.339
3100.000	0.885	281.366	3099.819	11.828	-9.219	11.828	14.997	322.066	0.104
3200.000	0.788	291.301	3199.808	12.230	-10.617	12.230	16.195	319.039	0.175
3300.000	1.084	316.236	3299.795	13.163	-11.911	13.163	17.752	317.857	0.497
3400.000	0.294	293.153	3399.787	13.947	-12.801	13.947	18.931	317.452	0.822

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	0.875	196.523	3499.783	13.316	-13.254	13.316	18.788	315.133	0.954
3600.000	0.932	192.787	3599.770	11.791	-13.651	11.791	18.039	310.819	0.082
3700.000	1.164	203.604	3699.754	10.068	-14.238	10.068	17.438	305.265	0.304
3800.000	1.613	209.301	3799.724	7.910	-15.333	7.910	17.253	297.289	0.469
3900.000	1.754	236.183	3899.683	5.832	-17.293	5.832	18.250	288.635	0.794
4000.000	2.461	245.691	3999.615	4.096	-20.521	4.096	20.926	281.288	0.786
4100.000	2.513	253.239	4099.521	2.580	-24.577	2.580	24.712	275.993	0.331
4200.000	1.807	253.279	4199.449	1.494	-28.185	1.494	28.225	273.035	0.706
4300.000	1.685	259.570	4299.403	0.775	-31.141	0.775	31.150	271.425	0.227
4400.000	1.579	260.011	4399.362	0.270	-33.943	0.270	33.944	270.455	0.106
4500.000	1.069	250.814	4499.335	-0.276	-36.181	-0.276	36.182	269.563	0.551
4600.000	1.073	260.157	4599.318	-0.742	-37.984	-0.742	37.992	268.880	0.175
4700.000	0.693	260.770	4699.306	-0.999	-39.504	-0.999	39.517	268.551	0.380
4800.000	0.448	190.273	4799.302	-1.481	-40.171	-1.481	40.198	267.889	0.688
4900.000	0.422	205.401	4899.299	-2.198	-40.398	-2.198	40.458	266.886	0.117
5000.000	0.864	212.084	4999.292	-3.169	-40.957	-3.169	41.079	265.575	0.447
5100.000	0.583	185.557	5099.285	-4.315	-41.406	-4.315	41.630	264.051	0.430
5200.000	1.131	201.995	5199.273	-5.736	-41.825	-5.736	42.217	262.191	0.595
5300.000	0.930	209.962	5299.257	-7.354	-42.600	-7.354	43.230	260.205	0.247
5400.000	1.166	188.014	5399.241	-9.064	-43.147	-9.064	44.089	258.136	0.461
5500.000	1.233	160.564	5499.219	-11.086	-42.931	-11.086	44.339	255.521	0.573
5600.000	1.541	130.131	5599.191	-12.967	-41.544	-12.967	43.521	252.665	0.787
5700.000	1.686	130.697	5699.152	-14.793	-39.401	-14.793	42.086	249.421	0.145
5800.000	1.949	143.403	5799.102	-17.118	-37.272	-17.118	41.015	245.332	0.480
5900.000	1.477	132.950	5899.057	-19.361	-35.315	-19.361	40.274	241.267	0.564
6000.000	1.892	133.808	5999.014	-21.382	-33.180	-21.382	39.473	237.202	0.416
6100.000	1.527	122.464	6098.969	-23.240	-30.864	-23.240	38.635	233.022	0.496
6200.000	1.824	128.392	6198.926	-24.943	-28.493	-24.943	37.868	228.800	0.343
6300.000	1.562	132.475	6298.883	-26.852	-26.240	-26.852	37.544	224.340	0.288
6400.000	2.093	151.537	6398.832	-29.378	-24.365	-29.378	38.167	219.671	0.801
6500.000	1.404	134.255	6498.786	-31.838	-22.617	-31.838	39.054	215.389	0.860
6605.000	1.425	150.966	6603.754	-33.878	-21.062	-33.878	39.891	211.869	0.392

HORIZONTAL DISPLACEMENT IS  
39.891 FEET AT 211.869 DEGREES