



True Grid

Mag

Grid Convergence: 0.47°

Mag Declination: 8.60°

Bearing:

True = Mag + 8.60°

Grid = True - 0.47°



FINAL SURVEYS





5D Survey Report

Anadarko Petroleum

Field Name: WATTENBERG_ANADARKO_NAD 83
Site Name: CANNON 29-10HZ
Well Name: CANNON 36N-10HZ
Survey: Definitive Survey





Surveys for the CANNON 36N-10HZ

Site Name CANNON 29-10HZ	Units : US ft		North Reference : True		Convergence Angle : 0.47	
	Position		Northing : 1301569.32 US ft		Latitude : 40.158889	
			Easting : 3204399.75 US ft		Longitude : -104.768689	
	Elevation above:4949.00 US ft					
Comment :						
Slot Name CANNON 36N-10HZ	Position (Offsets relative to Site Centre)					
	+ N / -S : -108.56 US ft		Northing :1301462.25 US ft		Latitude : 40.158591	
	+ E / -W : 179.72 US ft		Easting :3204580.36 US ft		Longitude : -104.768046	
	Slot TVD Reference : Ground Elevation					
Elevation above : 4949.00 US ft						
Comment :						
Well Name CANNON 36N-10HZ	Type : Main well		UWI :			
	Rig Height <i>Drill Floor</i> : 16.00 US ft		Comment :			
	Relative to : 4965.00 US ft		Closure Azimuth : 165.007°			
	Closure Distance : 4471.27 US ft					
	Vertical Section (Position of Origin Relative to Slot)					
			+N / -S : 0.00 US ft		+E / -W : 0.00 US ft	
				Az :179.66°		

5D Survey Report

Target Set

Name : 8 **Number of Targets :** 1

Comment :

TargetName: PBHL Shape: Cuboid	Position (Relative to centre)				
	+ N / -S : -4344.01US ft		Northing : 1297128.13 US ft		
	+ E / -W : 1180.30 US ft		Easting : 3205796.44US ft		
	TVD (Drill Floor) : 7218.00 US ft				
	Orientation		Inclination : 0.00°		
Dimensions		Azimuth : 0.00°		Breadth : 1.00 US ft	
		Length : 1.00 US ft		Height : 1.00 US ft	

Survey Name :Definitive Survey

Date : 24/Jun/2013

Survey Tool :

Company :

Magnetic Model

Model Name: Default **Date:** 04/Apr/2013 **Field Strength:** 50000.0 nT **Declination:** 0.00° **Dip:** 0.00°

Survey Tool Ranges

Name	Start MD (us ft)	End MD (us ft)	Source Survey	
NSG Static GMS	0.00	896.00	GYROS	WFT MWD
MWD	896.00	11825.00		

Casing Points (Relative to centre, TVD relative to Drill Floor)						
Name	MD (US ft)	Inc (°)	TVD (US ft)	Az (°)	TVD (US ft)	Longitude (°)
7 in	7706.00	85.76	177.75	177.75	7194.15	-104.763855

Well path created using minimum curvature

Survey Points (Relative to centre, TVD relative to Drill Floor)						
TVD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N. Offset (US ft)	E. Offset (US ft)	VS (US ft)
0.00	0.00	0.00	0.00	0.00	0.00	-0.00
16.00	0.00	0.00	16.00	0.00	0.00	-0.00
116.00	0.17	285.65	116.00	0.04	-0.14	-0.04
216.00	0.19	307.22	216.00	0.18	-0.42	-0.18
316.00	0.20	331.71	316.00	0.43	-0.63	-0.44
416.00	0.17	14.29	416.00	0.73	-0.68	-0.74
516.00	0.27	110.21	516.00	0.79	-0.42	-0.80
616.00	0.28	250.83	616.00	0.63	-0.43	-0.64

Weatherford International Limited

5D 7.5.4 : 23 July 2013, 19:09:12 UTC

5D Survey Report

Survey Points (Relative to centre, TVD relative to Drill Floor)											Comment
VD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	Latitude (°)	Longitude (°)	VS (US ft)	
716.00	0.18	315.61	716.00	0.66	-0.77	1301462.91	3204579.58	40.158593	-104.768049	-0.67	TIE ON FIRST WFT SVY
816.00	0.09	105.19	816.00	0.76	-0.81	1301463.00	3204579.55	40.158593	-104.768049	-0.76	
896.00	0.24	287.67	896.00	0.79	-0.90	1301463.03	3204579.45	40.158593	-104.768049	-0.80	
992.00	0.14	58.12	992.00	0.91	-1.00	1301463.16	3204579.36	40.158593	-104.768050	-0.92	
1072.00	2.66	89.45	1071.97	0.98	0.94	1301463.24	3204581.30	40.158594	-104.768043	-0.98	
1164.00	5.23	73.63	1163.74	2.19	7.10	1301464.49	3204587.44	40.158597	-104.768021	-2.14	
1254.00	6.51	81.44	1253.27	4.10	16.08	1301466.48	3204596.41	40.158602	-104.767988	-4.01	
1344.00	7.51	84.92	1342.60	5.38	26.99	1301467.85	3204607.30	40.158606	-104.767949	-5.22	
1435.00	9.47	88.17	1432.60	6.15	40.39	1301468.73	3204620.70	40.158608	-104.767901	-5.91	
1527.00	12.00	81.53	1522.98	7.80	57.42	1301470.52	3204637.72	40.158612	-104.767841	-7.46	
1617.00	13.14	81.86	1610.82	10.62	76.80	1301473.51	3204657.07	40.158620	-104.767771	-10.17	
1707.00	14.17	81.72	1698.28	13.66	97.83	1301476.72	3204678.08	40.158628	-104.767696	-13.08	
1798.00	15.96	76.80	1786.15	18.12	121.04	1301481.37	3204701.24	40.158641	-104.767613	-17.40	
1889.00	14.55	73.82	1873.94	24.16	144.20	1301487.60	3204724.35	40.158657	-104.767530	-23.31	
1979.00	14.44	82.23	1961.09	28.83	166.18	1301492.45	3204746.29	40.158670	-104.767451	-27.84	
2069.00	14.96	78.42	2048.14	32.68	188.68	1301496.49	3204768.76	40.158681	-104.767371	-31.56	
2159.00	16.13	74.86	2134.85	38.28	212.12	1301502.28	3204792.16	40.158696	-104.767287	-37.02	
2250.00	15.71	66.34	2222.37	46.52	235.61	1301510.72	3204815.58	40.158719	-104.767203	-45.13	
2341.00	14.58	65.51	2310.21	56.22	257.32	1301520.59	3204837.21	40.158745	-104.767125	-54.69	
2437.00	14.99	58.84	2403.04	67.65	278.94	1301532.20	3204858.74	40.158777	-104.767048	-65.99	
2529.00	12.72	58.42	2492.36	79.11	297.76	1301543.82	3204877.45	40.158808	-104.766981	-77.34	
2621.00	12.94	64.84	2582.07	88.80	315.71	1301553.65	3204895.33	40.158835	-104.766916	-86.92	
2715.00	13.14	60.19	2673.64	98.58	334.51	1301563.59	3204914.04	40.158862	-104.766849	-96.60	
2808.00	12.66	69.68	2764.31	107.38	353.24	1301574.54	3204932.70	40.158886	-104.766782	-105.28	
2900.00	15.35	68.53	2853.56	115.34	374.03	1301580.67	3204953.42	40.158908	-104.766708	-113.12	
2993.00	15.73	66.25	2943.17	124.92	397.02	1301590.44	3204976.34	40.158934	-104.766626	-122.56	
3087.00	15.72	64.01	3033.65	135.63	420.13	1301601.34	3204999.36	40.158963	-104.766543	-133.14	
3180.00	14.74	63.01	3123.38	146.52	442.00	1301612.41	3205021.14	40.158993	-104.766465	-143.90	
3272.00	14.19	63.60	3212.46	156.85	462.53	1301622.91	3205041.58	40.159022	-104.766391	-154.10	
3357.00	14.37	68.49	3294.84	165.35	481.68	1301631.57	3205060.66	40.159045	-104.766323	-162.49	
3443.00	16.64	76.99	3377.72	172.04	503.61	1301638.43	3205082.53	40.159063	-104.766244	-169.04	
3528.00	16.11	77.08	3459.27	177.41	526.96	1301644.00	3205105.84	40.159078	-104.766161	-174.28	
3614.00	16.12	71.21	3541.89	183.93	549.89	1301650.70	3205128.72	40.159096	-104.766079	-180.66	
3699.00	16.14	70.72	3623.55	191.63	572.22	1301658.59	3205150.98	40.159117	-104.765999	-188.23	
3784.00	15.83	67.80	3705.26	199.91	594.10	1301667.05	3205172.79	40.159140	-104.765920	-196.38	
3870.00	15.60	65.40	3788.05	209.15	615.48	1301676.47	3205194.09	40.159165	-104.765844	-205.50	
3955.00	13.72	67.37	3870.28	217.79	635.17	1301685.27	3205213.72	40.159189	-104.765773	-214.02	
4041.00	15.04	63.20	3953.58	226.75	654.55	1301694.39	3205233.02	40.159213	-104.765704	-222.86	
4126.00	17.91	58.35	4035.09	238.58	675.52	1301706.39	3205253.89	40.159246	-104.765629	-234.57	
4211.00	18.12	63.62	4115.93	251.31	698.49	1301719.32	3205276.76	40.159281	-104.765547	-247.16	
4297.00	17.46	63.00	4197.82	263.11	721.97	1301731.31	3205300.13	40.159313	-104.765463	-258.82	

5D Survey Report

Survey Points (Relative to centre, TVD relative to Drill Floor)											Comment
VD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	Latitude (°)	Longitude (°)	VS (US ft)	
4382.00	17.25	69.79	4278.95	273.26	745.16	1301741.64	3205323.24	40.159341	-104.765380	-268.83	
4468.00	17.16	71.06	4361.11	281.78	769.13	1301750.36	3205347.14	40.159364	-104.765294	-277.21	
4553.00	16.77	70.78	4442.41	289.89	792.57	1301758.66	3205370.51	40.159387	-104.765210	-285.18	
4639.00	18.34	74.85	4524.40	297.51	817.34	1301766.49	3205395.22	40.159408	-104.765122	-292.65	
4724.00	15.91	70.87	4605.63	304.82	841.26	1301774.00	3205419.08	40.159428	-104.765036	-299.82	
4809.00	17.10	69.51	4687.13	313.01	863.98	1301782.38	3205441.73	40.159450	-104.764955	-307.88	
4895.00	18.57	70.05	4768.99	322.11	888.69	1301791.68	3205466.37	40.159475	-104.764866	-316.83	
4980.00	17.55	68.36	4849.80	331.46	913.33	1301801.23	3205490.93	40.159501	-104.764778	-326.03	
5066.00	15.36	64.70	4932.28	341.11	935.66	1301811.06	3205513.20	40.159527	-104.764698	-335.55	
5151.00	16.16	64.79	5014.08	350.96	956.56	1301821.08	3205534.00	40.159554	-104.764624	-345.28	
5237.00	14.63	63.79	5097.00	360.85	977.14	1301831.15	3205554.49	40.159582	-104.764550	-355.05	
5322.00	13.65	61.79	5179.42	370.34	995.61	1301840.78	3205572.88	40.159608	-104.764484	-364.42	
5407.00	12.41	59.60	5262.23	379.70	1012.32	1301850.28	3205589.52	40.159633	-104.764424	-373.68	
5493.00	11.71	64.12	5346.33	388.18	1028.15	1301858.90	3205605.27	40.159657	-104.764367	-382.08	
5578.00	10.08	74.97	5429.81	393.88	1043.09	1301864.72	3205620.17	40.159672	-104.764314	-387.68	
5664.00	8.99	71.42	5514.62	397.97	1056.73	1301868.92	3205633.77	40.159683	-104.764265	-391.69	
5749.00	7.37	64.50	5598.75	402.44	1067.95	1301873.48	3205644.95	40.159696	-104.764225	-396.09	
5834.00	7.02	58.68	5683.08	407.48	1077.31	1301878.60	3205654.27	40.159710	-104.764192	-401.08	
5920.00	5.76	50.75	5768.55	412.95	1085.14	1301884.13	3205662.06	40.159724	-104.764164	-406.50	
6005.00	5.40	53.59	5853.15	418.02	1091.66	1301889.26	3205668.54	40.159738	-104.764140	-411.53	
6091.00	7.29	67.34	5938.62	422.52	1099.95	1301893.83	3205676.79	40.159751	-104.764111	-415.99	
6176.00	6.26	62.89	6023.03	426.71	1109.05	1301898.09	3205685.86	40.159762	-104.764078	-420.12	
6262.00	4.65	51.26	6108.64	431.03	1115.95	1301902.47	3205692.72	40.159774	-104.764053	-424.40	
6347.00	4.49	78.42	6193.38	433.86	1121.90	1301905.34	3205698.64	40.159782	-104.764032	-427.19	
6432.00	2.61	90.76	6278.21	434.50	1127.09	1301906.03	3205703.83	40.159784	-104.764013	-427.80	
6518.00	1.77	77.87	6364.15	434.75	1130.35	1301906.31	3205707.08	40.159784	-104.764002	-428.04	
6603.00	2.18	81.46	6449.10	435.27	1133.23	1301906.85	3205709.96	40.159786	-104.763991	-428.53	
6688.00	1.82	218.95	6534.08	434.46	1133.98	1301906.04	3205710.72	40.159784	-104.763989	-427.72	
6774.00	8.29	168.11	6619.72	427.32	1134.40	1301898.91	3205711.20	40.159764	-104.763987	-420.58	
6859.00	14.80	163.09	6702.96	410.92	1138.82	1301882.54	3205715.76	40.159719	-104.763971	-404.15	
6945.00	21.07	169.53	6784.75	385.18	1144.84	1301856.86	3205721.98	40.159648	-104.763950	-378.38	
7030.00	28.14	175.93	6861.99	350.11	1149.04	1301821.82	3205726.47	40.159552	-104.763935	-343.28	
7116.00	36.30	179.50	6934.69	304.34	1150.71	1301776.07	3205728.52	40.159426	-104.763929	-297.51	
7201.00	45.26	179.01	6998.99	248.89	1151.45	1301720.62	3205729.72	40.159274	-104.763926	-242.05	
7286.00	51.64	176.20	7055.35	185.38	1154.18	1301657.14	3205732.97	40.159100	-104.763917	-178.53	
7372.00	59.31	176.63	7104.05	114.72	1158.60	1301586.52	3205737.97	40.158906	-104.763901	-107.84	
7457.00	68.32	177.31	7141.52	38.62	1162.61	1301510.46	3205742.61	40.158697	-104.763886	-31.72	
7543.00	75.35	177.93	7168.32	-42.97	1165.99	1301438.90	3205746.66	40.158473	-104.763874	49.89	
7628.00	81.37	178.86	7185.46	-126.15	1168.31	1301345.74	3205749.67	40.158245	-104.763866	133.08	
7658.00	83.13	177.42	7189.51	-155.86	1169.28	1301316.04	3205750.88	40.158163	-104.763863	162.79	
7706.00	85.76	177.75	7194.15	-203.59	1171.29	1301268.33	3205753.29	40.158032	-104.763855	210.53	7 in

5D Survey Report

Survey Points (Relative to centre, TVD relative to Drill Floor)												
VD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N. Offset (US ft)	E. Offset (US ft)	Northing (US ft)	Easting (US ft)	Latitude (°)	Longitude (°)	VS (US ft)	Comment	
7770.00	89.26	178.19	7196.93	-267.47	1173.55	1301204.46	3205756.08	40.157657	-104.763847	274.43		
7855.00	89.12	177.67	7198.14	-352.41	1176.62	1301119.56	3205759.85	40.157623	-104.763836	359.39		
8026.00	92.28	180.96	7196.05	-523.34	1178.67	1300948.65	3205763.30	40.157154	-104.763829	530.33		
8112.00	92.10	180.59	7192.76	-609.27	1177.51	1300862.71	3205762.85	40.156918	-104.763833	616.25		
8197.00	92.53	180.09	7189.33	-694.20	1177.00	1300777.78	3205763.05	40.156685	-104.763835	701.17		
8282.00	92.78	179.91	7185.39	-779.11	1177.00	1300692.88	3205763.75	40.156452	-104.763835	786.08		
8368.00	91.11	179.42	7182.47	-865.05	1177.50	1300606.94	3205764.96	40.156216	-104.763833	872.02		
8453.00	89.38	179.42	7182.11	-950.04	1178.36	1300521.96	3205766.52	40.155983	-104.763830	957.02		
8539.00	88.50	179.96	7183.70	-1036.03	1178.83	1300435.98	3205767.69	40.155747	-104.763829	1043.00		
8624.00	89.38	182.05	7185.27	-1120.99	1177.34	1300351.00	3205766.90	40.155514	-104.763834	1127.96		
8710.00	89.45	183.21	7186.15	-1206.90	1173.39	1300265.07	3205763.67	40.155278	-104.763848	1213.84		
8795.00	89.32	184.28	7187.06	-1291.71	1167.84	1300180.22	3205758.81	40.155045	-104.763868	1298.62		
8881.00	89.26	183.36	7188.13	-1377.51	1162.11	1300094.37	3205753.79	40.154809	-104.763888	1384.38		
8966.00	89.20	182.97	7189.27	-1462.37	1157.42	1300009.47	3205749.80	40.154576	-104.763905	1469.22		
9051.00	88.89	181.69	7190.69	-1547.29	1153.97	1299924.53	3205747.05	40.154343	-104.763918	1554.11		
9137.00	88.27	179.45	7192.82	-1633.25	1153.11	1299838.56	3205746.90	40.154107	-104.763921	1640.07		
9222.00	88.15	181.11	7195.47	-1718.21	1152.69	1299753.61	3205747.19	40.153874	-104.763922	1725.02		
9308.00	88.03	182.67	7198.34	-1804.11	1149.86	1299667.68	3205745.06	40.153638	-104.763932	1810.90		
9393.00	88.89	183.05	7200.62	-1888.97	1145.62	1299582.79	3205741.52	40.153405	-104.763948	1895.74		
9478.00	91.11	181.91	7200.62	-1973.89	1141.94	1299497.85	3205738.54	40.153172	-104.763961	1980.63		
9564.00	93.08	180.88	7197.48	-2059.80	1139.85	1299411.92	3205737.16	40.152936	-104.763968	2066.53		
9649.00	91.97	178.40	7193.73	-2144.71	1140.38	1299327.02	3205738.39	40.152703	-104.763966	2151.44		
9735.00	90.49	177.51	7191.89	-2230.63	1143.45	1299241.13	3205742.17	40.152468	-104.763955	2237.37		
9820.00	90.86	177.14	7190.89	-2315.53	1147.42	1299156.26	3205746.84	40.152234	-104.763941	2322.30		
9905.00	91.85	176.60	7188.88	-2400.38	1152.06	1299071.46	3205752.18	40.152002	-104.763925	2407.17		
9991.00	90.62	177.92	7187.02	-2486.26	1156.17	1298985.61	3205756.99	40.151766	-104.763910	2493.07		
10076.00	87.97	178.38	7188.07	-2571.20	1158.91	1298900.70	3205760.44	40.151533	-104.763900	2578.03		
10161.00	88.77	179.13	7190.49	-2656.14	1160.76	1298815.77	3205762.98	40.151299	-104.763894	2662.98		
10247.00	88.89	180.23	7192.24	-2742.12	1161.24	1298729.80	3205764.17	40.151063	-104.763892	2748.96		
10332.00	89.26	179.52	7193.62	-2827.11	1161.42	1298644.82	3205765.06	40.150830	-104.763891	2833.95		
10418.00	88.58	179.98	7195.24	-2913.09	1161.80	1298558.84	3205766.14	40.150594	-104.763890	2919.93		
10503.00	87.16	179.91	7198.40	-2998.03	1161.88	1298473.90	3205766.93	40.150361	-104.763890	3004.87		
10589.00	86.05	179.44	7203.49	-3083.88	1162.37	1298388.06	3205768.12	40.150125	-104.763888	3090.72		
10674.00	88.89	179.40	7207.24	-3168.78	1163.23	1298303.17	3205769.68	40.149892	-104.763885	3175.63		
10760.00	88.77	179.63	7209.00	-3254.76	1163.95	1298217.20	3205771.12	40.149656	-104.763882	3261.61		
10845.00	90.35	182.08	7209.65	-3339.74	1162.69	1298132.21	3205770.55	40.149423	-104.763887	3346.58		
10931.00	90.18	182.15	7209.25	-3425.68	1159.51	1298046.25	3205768.08	40.149187	-104.763898	3432.50		
11016.00	91.05	181.70	7208.34	-3510.63	1156.66	1297961.28	3205765.93	40.148954	-104.763908	3517.43		
11101.00	90.80	181.02	7206.97	-3595.59	1154.64	1297876.30	3205764.61	40.148721	-104.763916	3602.38		
11187.00	90.00	181.68	7206.37	-3681.56	1152.61	1297790.32	3205763.30	40.148485	-104.763923	3688.34		
11272.00	89.21	180.84	7206.95	-3766.54	1150.75	1297705.33	3205762.13	40.148251	-104.763930	3773.30		

5D Survey Report

Survey Points (Relative to centre, TVD relative to Drill Floor)											
VD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	Latitude (°)	Longitude (°)	VS (US ft)	Comment
11356.00	88.34	180.77	7208.79	-3852.51	1149.54	1297619.35	3205761.63	40.148015	-104.763934	3859.26	
11443.00	89.65	179.26	7210.28	-3937.49	1149.52	1297534.37	3205762.31	40.147782	-104.763934	3944.24	
11528.00	88.21	179.86	7211.87	-4022.47	1150.17	1297449.40	3205763.66	40.147549	-104.763932	4029.23	
11614.00	87.72	179.55	7214.92	-4108.42	1150.61	1297363.46	3205764.81	40.147313	-104.763930	4115.17	
11699.00	87.41	178.27	7218.53	-4193.32	1152.23	1297278.57	3205767.13	40.147080	-104.763924	4200.09	
11767.00	86.83	177.85	7221.95	-4261.20	1154.52	1297210.72	3205769.99	40.146893	-104.763916	4267.97	LAST WFT SVY
11825.00	86.83	177.85	7225.16	-4319.07	1156.70	1297152.87	3205772.64	40.146734	-104.763908	4325.86	PROJ TO TD
Formation Points (Relative to centre, TVD relative to Drill Floor)											
Name						MD (US ft)	TVD (US ft)				
PARKMAN						4091.34	4002.00				
SUSSEX						4518.09	4409.00				
SHARON SPRINGS						7295.19	7061.00				
NIOBRARA A						7445.09	7137.00				
NIOBRARA B CHALK						7775.08	7197.00				