



CATHEDRAL

Job Number: 115502
 Company: Anadarko
 Lease/Well: Markham 13-8
 Location: SWSW Sec8-T2N-R65W
 Rig Name: Xtreme 14
 RKB: 4950
 G.L. or M.S.L.: 4950

State/Country: Colorado / USA
 Declination: 8.76
 Grid: True North
 File name: C:\WINSERVE\115502.SVY
 Date/Time: 12-Nov-11 / 08:47
 Curve Name: Markham 34-8

Cathedral Energy

WINSERVE SURVEY CALCULATIONS
Minimum Curvature Method
Vertical Section Plane 209.75
Vertical Section Referenced to Wellhead
Rectangular Coordinates Referenced to Wellhead

<i>Measured Depth FT</i>	<i>Incl Angle Deg</i>	<i>Drift Direction Deg</i>	<i>True Vertical Depth</i>	<i>N-S FT</i>	<i>E-W FT</i>	<i>Vertical Section FT</i>	<i>C L O S U R E Distance FT</i>	<i>Direction Deg</i>	<i>Dogleg Severity Deg/100</i>
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
152.00	.10	62.40	152.00	.06	.12	-.11	.13	62.40	.07
245.00	1.10	247.20	244.99	-.25	-.63	.53	.68	248.71	1.29
338.00	2.90	214.90	337.94	-2.52	-2.80	3.58	3.77	228.01	2.21
459.00	5.10	212.50	458.63	-9.57	-7.44	12.00	12.12	217.88	1.82
549.00	7.00	215.30	548.13	-17.42	-12.76	21.46	21.60	216.23	2.14
638.00	9.50	203.10	636.21	-28.60	-18.78	34.15	34.22	213.29	3.41
726.00	11.10	202.20	722.79	-43.13	-24.83	49.76	49.77	209.93	1.83
789.00	12.20	202.20	784.49	-54.91	-29.64	62.38	62.39	208.36	1.75
908.00	12.10	202.10	900.82	-78.10	-39.08	87.20	87.34	206.58	.09
996.00	13.80	209.70	986.59	-95.77	-47.75	106.84	107.01	206.50	2.73
1086.00	15.50	211.70	1073.66	-115.33	-59.39	129.60	129.72	207.25	1.97
1174.00	15.00	212.50	1158.56	-134.94	-71.69	152.72	152.80	207.98	.62
1259.00	14.30	213.20	1240.80	-153.00	-83.35	174.19	174.23	208.58	.85
1351.00	16.70	215.60	1329.44	-173.26	-97.26	198.68	198.69	209.31	2.70
1441.00	16.50	216.80	1415.69	-194.00	-112.45	224.23	224.24	210.10	.44
1529.00	16.70	217.00	1500.03	-214.11	-127.54	249.18	249.22	210.78	.24
1619.00	16.30	216.80	1586.32	-234.55	-142.89	274.54	274.65	211.35	.45
1708.00	15.60	213.60	1671.89	-254.52	-157.00	298.88	299.04	211.67	1.26
1797.00	14.70	209.80	1757.80	-274.28	-169.23	322.11	322.29	211.67	1.51
1884.00	13.40	204.70	1842.20	-293.02	-178.93	343.19	343.33	211.41	2.06
1973.00	12.10	205.10	1929.01	-310.84	-187.20	362.76	362.86	211.06	1.46
2062.00	11.60	204.70	2016.11	-327.42	-194.89	380.97	381.03	210.76	.57
2150.00	10.10	205.70	2102.53	-342.41	-201.94	397.48	397.52	210.53	1.72
2239.00	9.80	206.90	2190.19	-356.20	-208.75	412.83	412.86	210.37	.41

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
2329.00	9.30	207.00	2278.95	-369.51	-215.51	427.75	427.76	210.25	.56
2417.00	10.90	208.70	2365.58	-383.14	-222.74	443.17	443.18	210.17	1.85
2505.00	11.90	211.30	2451.84	-398.19	-231.45	460.56	460.57	210.17	1.28
2595.00	11.90	211.10	2539.91	-414.07	-241.06	479.11	479.13	210.21	.05
2685.00	12.50	208.50	2627.88	-430.57	-250.50	498.12	498.14	210.19	.90
2775.00	12.80	205.20	2715.69	-448.15	-259.39	517.80	517.81	210.06	.87
2863.00	12.90	201.40	2801.49	-466.12	-267.13	537.24	537.24	209.82	.97
2952.00	13.20	204.60	2888.19	-484.61	-274.98	557.19	557.19	209.57	.88
3041.00	14.80	206.80	2974.55	-503.99	-284.34	578.66	578.67	209.43	1.89
3131.00	13.70	208.00	3061.78	-523.67	-294.53	600.80	600.81	209.35	1.27
3221.00	14.70	206.80	3149.03	-543.27	-304.68	622.85	622.87	209.28	1.16
3310.00	13.10	206.30	3235.42	-562.39	-314.24	644.20	644.23	209.19	1.80
3399.00	13.10	208.30	3322.10	-580.31	-323.49	664.35	664.39	209.14	.51
3487.00	15.20	210.00	3407.43	-599.09	-333.99	685.86	685.90	209.14	2.43
3576.00	13.20	209.80	3493.70	-618.01	-344.87	707.69	707.73	209.16	2.25
3666.00	13.80	211.40	3581.22	-636.09	-355.57	728.69	728.73	209.21	.79
3754.00	14.20	211.30	3666.60	-654.27	-366.65	749.97	750.00	209.27	.46
3842.00	12.40	210.80	3752.24	-671.61	-377.09	770.21	770.24	209.31	2.05
3929.00	13.80	212.10	3836.97	-688.43	-387.39	789.92	789.94	209.37	1.64
4017.00	12.30	211.80	3922.70	-705.28	-397.91	809.78	809.79	209.43	1.71
4104.00	13.40	211.20	4007.52	-721.78	-408.01	829.12	829.12	209.48	1.27
4194.00	11.80	211.70	4095.35	-738.53	-418.25	848.74	848.75	209.52	1.78
4284.00	13.40	213.50	4183.18	-755.06	-428.85	868.34	868.35	209.59	1.83
4372.00	13.80	216.00	4268.71	-772.06	-440.64	888.95	888.95	209.72	.81
4462.00	12.00	217.40	4356.44	-788.17	-452.64	908.90	908.90	209.87	2.03
4551.00	10.70	218.20	4443.69	-802.02	-463.36	926.24	926.25	210.02	1.47
4641.00	10.90	221.80	4532.10	-814.93	-474.20	942.83	942.85	210.20	.78
4730.00	11.80	219.00	4619.36	-828.27	-485.54	960.04	960.10	210.38	1.19
4819.00	13.10	214.80	4706.27	-843.63	-497.02	979.07	979.15	210.50	1.78
4908.00	13.80	212.80	4792.83	-860.83	-508.53	999.71	999.82	210.57	.94
4996.00	11.30	210.20	4878.72	-877.11	-518.55	1018.82	1018.93	210.59	2.91
5086.00	10.70	209.40	4967.06	-892.01	-527.09	1035.99	1036.10	210.58	.69
5176.00	11.90	206.40	5055.32	-907.60	-535.32	1053.61	1053.71	210.53	1.48
5264.00	11.20	199.90	5141.54	-923.76	-542.26	1071.09	1071.16	210.41	1.68
5353.00	10.50	201.00	5228.95	-939.46	-548.11	1087.62	1087.66	210.26	.82
5442.00	9.50	200.70	5316.59	-953.90	-553.61	1102.89	1102.91	210.13	1.13
5530.00	8.40	199.60	5403.52	-966.75	-558.34	1116.39	1116.40	210.01	1.26
5617.00	7.60	197.60	5489.67	-978.22	-562.21	1128.27	1128.27	209.89	.97
5706.00	7.20	196.70	5577.93	-989.17	-565.59	1139.46	1139.46	209.76	.47
5795.00	5.30	196.60	5666.40	-998.46	-568.37	1148.89	1148.89	209.65	2.13
5883.00	4.30	197.30	5754.09	-1005.50	-570.51	1156.07	1156.08	209.57	1.14
5972.00	3.60	194.60	5842.88	-1011.39	-572.21	1162.03	1162.04	209.50	.81
6061.00	3.30	185.50	5931.72	-1016.65	-573.16	1167.06	1167.08	209.41	.70
6151.00	2.70	180.50	6021.59	-1021.34	-573.42	1171.27	1171.30	209.31	.73
6239.00	1.10	171.00	6109.54	-1024.25	-573.31	1173.74	1173.79	209.24	1.85

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
6327.00	.80	158.00	6197.53	-1025.65	-572.95	1174.78	1174.83	209.19	.42
6414.00	.70	168.60	6284.52	-1026.74	-572.61	1175.55	1175.62	209.15	.20
6503.00	.60	176.70	6373.52	-1027.74	-572.48	1176.35	1176.42	209.12	.15
6592.00	.50	178.20	6462.51	-1028.59	-572.44	1177.07	1177.15	209.10	.11
6681.00	.40	182.20	6551.51	-1029.29	-572.44	1177.68	1177.76	209.08	.12
6770.00	.60	176.70	6640.51	-1030.06	-572.43	1178.35	1178.43	209.06	.23
6860.00	.70	173.80	6730.50	-1031.08	-572.34	1179.19	1179.28	209.03	.12
6948.00	.60	152.10	6818.50	-1032.02	-572.06	1179.87	1179.97	209.00	.30
7035.00	.60	152.70	6905.49	-1032.83	-571.64	1180.36	1180.47	208.96	.01
7123.00	.60	151.10	6993.49	-1033.64	-571.21	1180.85	1180.97	208.93	.02
7210.00	.40	171.10	7080.48	-1034.34	-570.94	1181.32	1181.46	208.90	.30
7299.00	.50	172.40	7169.48	-1035.03	-570.84	1181.88	1182.01	208.88	.11
7388.00	.40	161.00	7258.48	-1035.71	-570.69	1182.39	1182.53	208.86	.15
7478.00	.30	167.60	7348.48	-1036.24	-570.54	1182.77	1182.92	208.84	.12
7566.00	.30	155.30	7436.47	-1036.67	-570.39	1183.08	1183.23	208.82	.07
7655.00	.10	44.00	7525.47	-1036.83	-570.24	1183.14	1183.30	208.81	.39
7744.00	.30	31.70	7614.47	-1036.58	-570.06	1182.83	1182.99	208.81	.23
7832.00	.40	77.00	7702.47	-1036.31	-569.64	1182.39	1182.55	208.80	.32
7959.00	.40	73.30	7829.47	-1036.08	-568.79	1181.77	1181.94	208.77	.02
Projection To Bit									
8014.00	.40	73.30	7884.47	-1035.97	-568.42	1181.49	1181.67	208.75	.00