

Scale 1 cm = 500 ft

Great Western Operating Co, LLC
Wellbore Survey Report
Wellpath: Marcus LD 11-371HNX (AWP#1)
MDs and TVDs are from Rig (Actual Datum #1 5062.0ft above Mean Sea Level)

Wellbore Information

Date Created	Date Revised	API #	Name
Dec-27-2017	Mar-15-2018	05-123-45383	Marcus LD 11-371HNX (AWB)

Slot Coordinates

Latitude	Longitude
40.00274200	-104.86804400

Pad Information

Name	Ground Elev
Marcus	5042.00

Field

Name
Wattenburg

Wellpath Report

MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]
0.00	0.00	0.000	0.00	0.00	0.00		0.00
20.00	0.00	25.440	20.00	0.00	0.00	==>	0.00
116.50	0.62	25.440	116.50	0.47	0.22	0.64	-0.39
212.50	1.23	20.080	212.49	1.91	0.80	0.64	-1.59
307.50	1.01	61.560	307.47	3.26	1.89	0.86	-2.58
402.50	0.70	89.680	402.46	3.67	3.20	0.54	-2.58
495.50	0.44	90.480	495.45	3.67	4.13	0.28	-2.31
591.50	0.57	83.970	591.45	3.71	4.97	0.15	-2.11
687.50	1.01	101.460	687.44	3.60	6.28	0.52	-1.62
782.50	1.58	115.440	782.42	2.87	8.28	0.68	-0.35
878.50	1.01	126.770	878.39	1.79	10.15	0.65	1.23
974.50	0.53	98.210	974.38	1.22	11.27	0.63	2.09
1070.50	1.32	103.480	1070.37	0.90	12.78	0.83	2.84
1166.50	0.97	107.880	1166.35	0.39	14.63	0.38	3.86
1261.50	0.75	119.740	1261.34	-0.16	15.94	0.30	4.77
1357.50	0.48	126.330	1357.33	-0.71	16.81	0.29	5.55
1451.50	0.83	98.210	1451.33	-1.04	17.80	0.50	6.15
1546.50	0.57	98.200	1546.32	-1.21	18.95	0.27	6.64
1640.50	0.79	80.980	1640.31	-1.17	20.05	0.32	6.93
1683.50	1.01	83.270	1683.31	-1.08	20.72	0.52	7.04
1751.00	1.32	73.190	1750.79	-0.79	22.06	0.55	7.14
1796.00	1.41	75.290	1795.78	-0.50	23.09	0.23	7.16
1885.00	3.71	122.450	1884.69	-1.76	26.58	3.30	9.39
1975.00	6.11	136.640	1974.36	-6.81	32.32	2.97	15.88
2065.00	8.70	141.310	2063.60	-15.61	39.87	2.95	26.48
2154.00	10.47	132.200	2151.36	-26.29	50.07	2.61	39.67
2243.00	12.82	117.110	2238.54	-36.23	64.85	4.30	53.46
2332.00	16.60	120.040	2324.61	-47.10	84.65	4.33	69.60
2422.00	18.84	119.020	2410.34	-60.58	108.49	2.51	89.41
2511.00	22.24	116.560	2493.67	-75.09	136.13	3.94	111.30
2600.00	24.73	112.140	2575.30	-89.64	168.45	3.43	134.59
2690.00	27.41	110.090	2656.13	-103.85	205.35	3.14	158.88
2779.00	29.08	110.430	2734.53	-118.44	244.86	1.89	184.28
2868.00	31.86	110.320	2811.24	-134.15	287.16	3.12	211.57
2957.00	34.03	111.820	2885.92	-151.57	332.32	2.60	241.32
3047.00	34.89	110.230	2960.13	-169.83	379.85	1.38	272.56
3136.00	34.89	108.550	3033.13	-186.73	427.87	1.08	302.65
3226.00	34.89	110.940	3106.96	-204.12	476.31	1.52	333.32
3315.00	35.40	111.710	3179.73	-222.75	524.04	0.76	364.98
3405.00	35.28	111.470	3253.15	-241.91	572.44	0.20	397.33
3494.00	35.35	111.070	3325.77	-260.57	620.39	0.27	429.08
3583.00	35.40	110.350	3398.34	-278.79	668.58	0.47	460.48
3672.00	35.33	110.330	3470.92	-296.70	716.88	0.08	491.60
3762.00	35.55	109.620	3544.25	-314.52	765.93	0.52	522.87
3851.00	35.39	110.090	3616.73	-332.06	814.50	0.36	553.73
3940.00	35.48	112.940	3689.25	-350.98	862.49	1.86	585.74
4029.00	35.44	114.990	3761.74	-371.95	909.67	1.34	619.47
4119.00	35.53	116.260	3835.03	-394.55	956.77	0.83	654.74
4208.00	35.43	116.020	3907.50	-417.30	1003.14	0.19	689.95
4298.00	35.45	115.910	3980.83	-440.15	1050.06	0.07	725.41
4387.00	35.47	116.600	4053.32	-462.99	1096.37	0.45	760.68

4477.00	35.45	117.340	4126.63	-486.67	1142.90	0.48	796.82
4566.00	35.26	120.890	4199.22	-511.72	1187.88	2.32	833.82
4655.00	35.56	121.780	4271.76	-538.53	1231.92	0.67	872.25
4744.00	35.61	119.650	4344.14	-564.98	1276.44	1.39	910.46
4834.00	35.69	116.350	4417.28	-589.60	1322.74	2.14	947.43
4923.00	35.64	113.580	4489.60	-611.50	1369.78	1.82	982.01
5012.00	35.62	112.320	4561.93	-631.71	1417.52	0.83	1015.18
5102.00	35.57	111.740	4635.12	-651.36	1466.08	0.38	1048.06
5191.00	35.68	111.060	4707.46	-670.28	1514.34	0.46	1080.14
5281.00	35.62	111.360	4780.60	-689.25	1563.24	0.21	1112.47
5370.00	35.61	111.750	4852.95	-708.30	1611.45	0.26	1144.65
5460.00	35.67	111.810	4926.09	-727.75	1660.14	0.08	1177.38
5549.00	35.64	112.060	4998.41	-747.13	1708.27	0.17	1209.87
5639.00	35.54	112.460	5071.60	-766.97	1756.74	0.28	1242.90
5728.00	35.56	112.670	5144.01	-786.83	1804.53	0.14	1275.74
5817.00	35.55	112.610	5216.41	-806.75	1852.29	0.04	1308.64
5907.00	35.53	113.550	5289.65	-827.26	1900.42	0.61	1342.21
5997.00	35.52	113.680	5362.90	-848.21	1948.33	0.08	1376.14
6086.00	35.58	113.630	5435.31	-868.97	1995.73	0.07	1409.74
6175.00	35.61	113.840	5507.68	-889.82	2043.15	0.14	1443.43
6265.00	35.49	113.160	5580.90	-910.69	2091.14	0.46	1477.30
6354.00	35.56	112.740	5653.34	-930.85	2138.76	0.29	1510.39
6444.00	35.49	111.830	5726.58	-950.68	2187.15	0.59	1543.39
6533.00	35.58	111.750	5799.01	-969.88	2235.18	0.11	1575.67
6623.00	35.56	113.200	5872.22	-989.90	2283.55	0.94	1608.84
6712.00	35.66	114.850	5944.57	-1010.99	2330.88	1.09	1642.74
6802.00	35.50	116.500	6017.77	-1033.68	2378.07	1.08	1678.12
6891.00	35.61	117.280	6090.18	-1057.08	2424.23	0.52	1713.89
6980.00	35.52	116.630	6162.58	-1080.55	2470.37	0.44	1749.71
7070.00	35.53	116.270	6235.83	-1103.84	2517.19	0.23	1785.57
7159.00	35.43	115.620	6308.30	-1126.44	2563.64	0.44	1820.65
7248.00	35.60	115.770	6380.74	-1148.86	2610.23	0.21	1855.60
7338.00	35.58	114.950	6453.93	-1171.29	2657.56	0.53	1890.78
7427.00	35.56	114.380	6526.33	-1192.90	2704.60	0.37	1925.09
7517.00	35.56	114.080	6599.54	-1214.38	2752.33	0.19	1959.47
7606.00	35.53	114.220	6671.96	-1235.55	2799.54	0.10	1993.40
7696.00	35.57	114.090	6745.18	-1256.96	2847.29	0.10	2027.73
7785.00	35.56	113.060	6817.58	-1277.66	2894.73	0.67	2061.28
7875.00	35.40	112.450	6890.87	-1297.87	2942.90	0.43	2094.57
7964.00	35.53	113.050	6963.36	-1317.84	2990.52	0.42	2127.48
7976.75	35.54	113.270	6973.73	-1320.75	2997.34	1.01	2132.24
8009.00	35.57	113.830	6999.97	-1328.24	3014.53	1.01	2144.39
8053.00	36.92	117.010	7035.46	-1339.42	3038.01	5.26	2161.89
8143.00	42.68	128.370	7104.67	-1370.70	3086.11	10.29	2205.76
8232.00	48.54	141.040	7167.03	-1415.49	3130.87	12.09	2261.59
8321.00	52.97	154.130	7223.47	-1473.56	3167.45	12.41	2327.78
8411.00	60.78	160.750	7272.65	-1543.13	3196.14	10.64	2402.67
8500.00	69.57	166.830	7310.01	-1620.61	3218.51	11.66	2483.31
8590.00	76.24	174.610	7336.48	-1705.40	3232.26	11.09	2568.44
8679.00	84.24	180.650	7351.57	-1792.92	3235.82	11.20	2653.25
8706.00	85.99	181.080	7353.87	-1819.82	3235.42	6.66	2678.88
8769.00	90.06	182.080	7356.05	-1882.75	3233.68	6.66	2738.60
8858.00	90.06	178.810	7355.95	-1971.73	3232.99	3.67	2823.57
8948.00	89.94	176.810	7355.95	-2061.66	3236.43	2.23	2910.65
9037.00	90.06	177.820	7355.95	-2150.56	3240.60	1.14	2996.94
9126.00	89.97	178.160	7355.93	-2239.51	3243.72	0.40	3082.98
9216.00	89.88	177.560	7356.05	-2329.44	3247.08	0.67	3170.04
9305.00	90.06	178.110	7356.09	-2418.38	3250.44	0.65	3256.13
9395.00	89.85	177.430	7356.17	-2508.31	3253.94	0.79	3343.23
9484.00	91.11	178.520	7355.42	-2597.25	3257.09	1.87	3429.26
9574.00	90.77	179.360	7353.94	-2687.22	3258.75	1.01	3515.86
9663.00	90.77	179.860	7352.75	-2776.21	3259.36	0.56	3601.21
9752.00	91.02	181.300	7351.36	-2865.19	3258.46	1.64	3686.12
9842.00	89.88	183.330	7350.65	-2955.11	3254.82	2.59	3771.13
9931.00	89.72	182.800	7350.96	-3043.98	3250.06	0.62	3854.81
10020.00	89.72	180.620	7351.40	-3132.94	3247.41	2.45	3939.19
10110.00	89.88	178.530	7351.71	-3222.93	3248.08	2.33	4025.52
10199.00	89.88	175.140	7351.90	-3311.78	3252.99	3.81	4111.98
10289.00	89.91	172.870	7352.06	-3401.28	3262.39	2.52	4200.37
10378.00	89.94	174.080	7352.18	-3489.70	3272.50	1.36	4287.93
10468.00	90.22	180.180	7352.05	-3579.55	3277.01	6.78	4375.23
10557.00	90.06	184.220	7351.83	-3668.46	3273.59	4.54	4459.34
10647.00	90.22	184.030	7351.61	-3758.23	3267.12	0.28	4543.39
10736.00	90.18	184.220	7351.30	-3847.00	3260.71	0.22	4626.50
10825.00	90.43	186.040	7350.83	-3935.64	3252.76	2.06	4709.03

10915.00	90.00	183.680	7350.49	-4025.31	3245.13	2.67	4792.65
11004.00	89.91	176.420	7350.56	-4114.25	3245.05	8.16	4877.76
11094.00	90.12	175.860	7350.54	-4204.04	3251.11	0.66	4965.46
11183.00	89.94	180.140	7350.49	-4292.97	3254.22	4.81	5051.47
11273.00	89.94	180.570	7350.59	-4382.97	3253.66	0.48	5137.45
11362.00	90.06	178.140	7350.59	-4471.95	3254.66	2.73	5222.91
11452.00	90.06	176.820	7350.49	-4561.86	3258.62	1.47	5310.12
11541.00	89.94	177.180	7350.49	-4650.74	3263.28	0.43	5396.54
11631.00	89.60	178.670	7350.85	-4740.68	3266.54	1.70	5483.56
11720.00	89.72	181.400	7351.38	-4829.67	3266.48	3.07	5568.72
11810.00	90.00	187.170	7351.60	-4919.38	3259.76	6.42	5652.64
11899.00	89.51	187.490	7351.98	-5007.65	3248.40	0.66	5733.84
11988.00	89.45	183.360	7352.79	-5096.23	3239.99	4.64	5816.19
12078.00	89.32	179.520	7353.76	-5186.18	3237.73	4.27	5901.63
12167.00	89.42	179.220	7354.74	-5275.17	3238.71	0.36	5987.08
12257.00	89.38	178.600	7355.68	-5365.15	3240.42	0.69	6073.70
12346.00	89.97	178.230	7356.18	-5454.11	3242.88	0.78	6159.57
12436.00	90.15	182.510	7356.09	-5544.09	3242.30	4.76	6245.52
12525.00	90.09	182.260	7355.90	-5633.01	3238.60	0.29	6329.56
12614.00	90.03	176.200	7355.81	-5721.96	3239.79	6.81	6415.04
12704.00	90.00	176.610	7355.78	-5811.78	3245.44	0.46	6502.65
12793.00	90.06	179.010	7355.74	-5900.71	3248.84	2.70	6588.75
12882.00	90.09	180.080	7355.62	-5989.71	3249.55	1.20	6674.14
12972.00	90.06	181.020	7355.50	-6079.70	3248.68	1.04	6760.02
13061.00	90.09	183.500	7355.39	-6168.63	3245.17	2.79	6844.12
13150.00	90.15	184.890	7355.20	-6257.39	3238.66	1.56	6927.19
13240.00	90.12	181.390	7354.99	-6347.24	3233.73	3.89	7011.76
13329.00	91.14	179.450	7354.01	-6436.22	3233.08	2.46	7096.75
13418.00	89.54	180.450	7353.48	-6525.22	3233.16	2.12	7181.95
13507.00	89.38	179.930	7354.32	-6614.21	3232.86	0.61	7267.04
13597.00	90.06	179.540	7354.76	-6704.21	3233.28	0.87	7353.31
13686.00	90.03	178.780	7354.69	-6793.20	3234.58	0.85	7438.86
13775.00	90.03	178.600	7354.64	-6882.18	3236.62	0.20	7524.61
13865.00	90.65	181.300	7354.11	-6972.17	3236.70	3.08	7610.77
13954.00	89.66	181.840	7353.87	-7061.13	3234.26	1.27	7695.21
14044.00	89.72	181.260	7354.36	-7151.10	3231.82	0.65	7780.62
14133.00	89.60	180.230	7354.88	-7240.09	3230.67	1.17	7865.46
14221.00	90.03	177.300	7355.17	-7328.05	3232.56	3.37	7950.21
14310.00	90.09	176.340	7355.08	-7416.92	3237.50	1.08	8036.69
14400.00	90.03	176.390	7354.98	-7506.74	3243.21	0.09	8124.31
14489.00	89.91	178.110	7355.03	-7595.63	3247.48	1.94	8210.63
14579.00	90.12	178.900	7355.00	-7685.60	3249.82	0.91	8297.42
14668.00	90.22	182.160	7354.74	-7774.58	3249.00	3.66	8382.36
14757.00	89.45	184.230	7355.00	-7863.44	3244.04	2.48	8465.97
14847.00	89.42	183.240	7355.88	-7953.24	3238.18	1.10	8550.22
14936.00	89.48	181.970	7356.74	-8042.14	3234.13	1.43	8634.14
15026.00	89.51	180.400	7357.53	-8132.12	3232.27	1.74	8719.72
15115.00	89.54	179.360	7358.27	-8221.11	3232.46	1.17	8804.96
15205.00	89.66	178.570	7358.90	-8311.10	3234.08	0.89	8891.55
15294.00	90.00	179.730	7359.16	-8400.08	3235.41	1.36	8977.11
15383.00	89.72	179.390	7359.38	-8489.08	3236.09	0.49	9062.49
15473.00	90.40	178.240	7359.29	-8579.06	3237.95	1.48	9149.15
15562.00	90.37	176.380	7358.69	-8667.96	3242.13	2.09	9235.45
15651.00	90.22	178.000	7358.23	-8756.84	3246.49	1.83	9321.79
15741.00	90.22	181.190	7357.88	-8846.83	3247.13	3.54	9408.10
15830.00	90.25	183.000	7357.52	-8935.77	3243.87	2.03	9492.29
15919.00	90.34	180.710	7357.06	-9024.71	3240.99	2.57	9576.59
16009.00	90.25	180.800	7356.60	-9114.70	3239.81	0.14	9662.38
16098.00	90.15	180.250	7356.29	-9203.70	3238.99	0.63	9747.32
16188.00	90.18	179.750	7356.03	-9293.70	3238.99	0.56	9833.46
16277.00	90.25	179.540	7355.69	-9382.70	3239.54	0.25	9918.81
16367.00	90.22	178.100	7355.32	-9472.67	3241.39	1.60	10005.46
16456.00	90.22	178.700	7354.98	-9561.64	3243.88	0.67	10091.34
16545.00	90.49	179.920	7354.43	-9650.63	3244.95	1.40	10176.82
16635.00	90.52	183.760	7353.64	-9740.56	3242.06	4.27	10262.06
16724.00	90.25	181.770	7353.04	-9829.45	3237.77	2.26	10345.90
16814.00	90.40	178.530	7352.53	-9919.44	3237.53	3.60	10431.96
16903.00	90.49	178.450	7351.84	-10008.40	3239.88	0.14	10517.79
16992.00	90.34	178.680	7351.19	-10097.37	3242.11	0.31	10603.60
17082.00	90.46	179.180	7350.56	-10187.35	3243.79	0.57	10690.21
17171.00	90.37	180.250	7349.92	-10276.35	3244.23	1.21	10775.52
17261.00	90.34	180.560	7349.36	-10366.35	3243.59	0.35	10861.47
17350.00	90.34	180.600	7348.83	-10455.34	3242.69	0.04	10946.39
17439.00	90.52	180.380	7348.17	-10544.33	3241.93	0.32	11031.35
17497.00	90.37	181.020	7347.72	-10602.33	3241.23	1.13	11086.65

17529.00	90.28	181.370	7347.54	-10634.32	3240.56	1.13	11117.08
17540.00	90.28	181.420	7347.48	-10645.32	3240.29	0.47	11127.53
17553.22	90.28	181.480	7347.42	-10658.53	3239.96	0.47	11140.08
17574.00	90.28	181.580	7347.32	-10679.30	3239.40	0.47	11159.80
17589.00	90.28	181.580	7347.24	-10694.30	3238.99	==>	11174.03
17598.00	90.28	181.580	7347.20	-10703.30	3238.74	==>	11182.57

Comments

MD[ft]	TVD[ft]	North[ft]	East[ft]	Comment
7976.75	6973.73	-1320.75	2997.34	460 Setback: 7977 / 6974 MD/TVD, 460 FNL, 2309 FWL Sec 02
8706.00	7353.87	-1819.82	3235.42	Top Perf: 8706 / 7354 MD/TVD, 960 FNL, 2545 FWL Sec 02
17497.00	7347.72	-10602.33	3241.23	Btm Perf: 17,497 / 7347 MD/TVD, 516 FSL, 2514 FWL Sec 11
17540.00	7347.48	-10645.32	3240.29	Base Toe Sub: 17,540 / 7347 MD/TVD, 473 FSL, 2513 FWL Sec 11
17553.22	7347.42	-10658.53	3239.96	460 Setback: 17,553 / 7347 MD/TVD, 460 FSL, 2513 FWL Sec 11
17589.00	7347.24	-10694.30	3238.99	5.5" Float Collar: 17,589 / 7347 MD/TVD, 424 FSL, 2512 FWL Sec 11
17598.00	7347.20	-10703.30	3238.74	5.5" Csg Shoe: 17,598 / 7347 MD/TVD, 415 FSL, 2511 FWL Sec 11
17598.00	7347.20	-10703.30	3238.74	BHL: 17,598 / 7347 MD/TVD, 415 FSL, 2511 FWL Sec 11

Hole Sections

Diameter [in]	Start MD[ft]	Start TVD[ft]	Start North[ft]	Start East[ft]	End MD[ft]	End TVD[ft]	End North[ft]	End East[ft]
13.500	0.00	0.00	0.00	0.00	1734.00	1733.80	-0.89	21.69
8.500	1734.00	1733.80	-0.89	21.69	17598.00	7347.20	-10703.30	3238.74

Casings

Name	Top MD[ft]	Top TVD[ft]	Top North[ft]	Top East[ft]	Shoe MD[ft]	Shoe TVD[ft]	Shoe North[ft]	Shoe East[ft]
9 5/8in Casing	0.00	0.00	0.00	0.00	1734.00	1733.80	-0.89	21.69
5 1/2in Casing	0.00	0.00	0.00	0.00	17598.00	7347.20	-10703.30	3238.74

Survey Tool Program

Reference	Survey Name	MD[ft]	TVD[ft]	Survey Tool	Error Model
320779	As Drilled - 20171227	17598.00	7347.20	MWD	

Coordinates are from Slot MD's are from Rig and TVD's are from Rig (Actual Datum #1 5062.0ft above Mean Sea Level)
 Vertical Section is from 0.00N 0.00E on azimuth 163.160 degrees
 Bottom hole distance is 11182.57 Feet on azimuth 163.16 degrees from Wellhead
 Calculation method uses Minimum Curvature method
 Prepared by Great Western Operating Co.
 Date Printed: