

Great Western Operating Co, LLC
Wellbore Survey Report
Wellpath: Marcus LD 11-373HNX (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
Nov-14-2017	Mar-15-2018	05-123-45380	Marcus LD 11-373HNX (AWB)

Slot Coordinates

Latitude	Longitude
40.00257500	-104.86858100

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
116.50	0.44	88.630	116.50	0.01	0.45	0.38	0.11
212.50	0.79	311.170	212.50	0.46	0.32	1.20	-0.36
307.50	0.75	294.240	307.49	1.14	-0.74	0.24	-1.30
402.50	1.14	278.210	402.47	1.53	-2.24	0.49	-2.07
495.50	0.57	358.630	495.47	2.13	-3.17	1.28	-2.89
591.50	0.92	293.590	591.46	2.91	-3.89	0.89	-3.84
687.50	0.40	278.210	687.45	3.27	-4.93	0.57	-4.46
782.50	1.49	262.570	782.44	3.16	-6.48	1.17	-4.76
878.50	1.01	273.820	878.42	3.05	-8.56	0.56	-5.21
974.50	0.57	191.810	974.41	2.64	-9.50	1.13	-5.06
1070.50	1.41	256.150	1070.40	1.89	-10.75	1.32	-4.67
1166.50	0.92	246.920	1166.38	1.31	-12.60	0.54	-4.59
1261.50	1.45	240.680	1261.36	0.42	-14.35	0.57	-4.20
1357.50	0.97	266.960	1357.33	-0.22	-16.22	0.75	-4.08
1451.50	0.31	309.500	1451.33	-0.10	-17.22	0.82	-4.46
1546.50	0.44	288.670	1546.33	0.18	-17.76	0.20	-4.87
1640.50	1.10	278.210	1640.32	0.42	-18.99	0.71	-5.43
1682.50	0.92	281.370	1682.31	0.55	-19.72	0.45	-5.74
1791.00	0.22	226.720	1790.81	0.58	-20.73	0.75	-6.04
1881.00	2.38	153.510	1880.78	-1.21	-20.02	2.58	-4.12
1970.00	4.82	132.300	1969.60	-5.39	-16.43	3.08	0.85
2060.00	7.69	110.160	2059.07	-10.01	-7.98	4.11	7.54
2149.00	10.47	105.580	2146.94	-14.23	5.40	3.23	15.15
2238.00	13.15	109.630	2234.05	-19.81	22.73	3.15	25.11
2327.00	15.29	115.360	2320.33	-28.24	42.87	2.88	38.57
2417.00	17.76	118.110	2406.60	-39.79	65.71	2.88	55.75
2506.00	20.82	116.330	2490.60	-53.20	91.86	3.50	75.60
2595.00	23.84	112.060	2572.92	-66.98	122.72	3.85	97.05
2685.00	27.80	108.280	2653.92	-80.40	159.52	4.76	119.72
2774.00	30.47	109.840	2731.66	-94.57	200.46	3.12	144.21
2864.00	31.29	110.440	2808.90	-110.47	243.83	0.97	171.02
2953.00	31.28	112.520	2884.96	-127.40	286.83	1.21	198.71
3042.00	31.09	115.190	2961.10	-146.03	328.97	1.57	227.83
3131.00	31.19	116.500	3037.28	-166.09	370.39	0.77	258.13
3221.00	31.33	119.160	3114.22	-187.89	411.68	1.54	290.07
3310.00	31.11	118.430	3190.33	-210.11	452.10	0.49	322.19
3399.00	31.33	118.270	3266.44	-232.02	492.70	0.26	354.05
3488.00	31.21	118.770	3342.51	-254.07	533.29	0.32	386.06
3578.00	31.24	118.610	3419.47	-276.47	574.22	0.10	418.48
3668.00	31.24	116.900	3496.43	-298.21	615.52	0.99	450.37
3757.00	31.37	115.930	3572.47	-318.78	656.94	0.58	481.16
3846.00	31.18	114.800	3648.54	-338.57	698.69	0.69	511.29
3936.00	30.57	116.570	3725.78	-358.58	740.30	1.22	541.59
4025.00	31.31	114.820	3802.12	-378.41	781.54	1.31	571.62
4114.00	31.19	111.570	3878.21	-396.59	823.96	1.90	600.38
4203.00	31.21	110.020	3954.34	-412.96	867.06	0.90	627.56
4293.00	30.95	112.240	4031.42	-429.70	910.39	1.31	655.16
4382.00	30.54	114.990	4107.92	-447.92	952.07	1.65	683.75

4472.00	31.28	116.210	4185.14	-467.90	993.76	1.08	714.05
4561.00	31.21	116.740	4261.23	-488.48	1035.08	0.32	744.82
4650.00	31.31	113.310	4337.31	-508.01	1076.92	2.00	774.72
4740.00	31.23	109.080	4414.25	-524.89	1120.45	2.44	802.51
4829.00	30.87	105.250	4490.50	-538.44	1164.29	2.26	827.17
4919.00	31.06	107.710	4567.68	-551.57	1208.68	1.42	851.58
5008.00	30.03	113.460	4644.35	-567.43	1250.99	3.48	878.06
5098.00	30.90	116.820	4721.93	-586.82	1292.28	2.13	907.68
5187.00	31.23	116.690	4798.16	-607.50	1333.29	0.38	938.46
5277.00	31.38	113.870	4875.06	-627.46	1375.56	1.64	968.90
5366.00	31.13	110.160	4951.15	-644.77	1418.35	2.18	996.90
5456.00	31.21	106.450	5028.17	-659.39	1462.56	2.14	1022.70
5545.00	31.21	105.840	5104.29	-672.21	1506.86	0.36	1046.78
5634.00	31.02	110.630	5180.49	-686.59	1550.51	2.79	1072.19
5724.00	31.25	116.290	5257.55	-705.10	1593.15	3.26	1101.32
5814.00	31.10	119.160	5334.55	-726.77	1634.38	1.66	1133.12
5903.00	30.76	121.910	5410.90	-750.00	1673.78	1.63	1165.94
5993.00	31.32	123.570	5488.02	-775.10	1712.80	1.14	1200.47
6082.00	31.11	119.670	5564.14	-799.28	1752.06	2.28	1234.16
6171.00	31.41	115.700	5640.23	-820.72	1792.94	2.34	1265.65
6261.00	31.27	110.340	5717.11	-839.01	1835.98	3.10	1294.68
6350.00	31.25	109.210	5793.19	-854.63	1879.44	0.66	1321.24
6439.00	31.02	110.600	5869.37	-870.30	1922.71	0.85	1347.79
6529.00	31.31	113.450	5946.39	-887.77	1965.87	1.67	1376.05
6618.00	31.07	115.420	6022.52	-906.83	2007.83	1.18	1405.52
6707.00	31.26	114.180	6098.68	-926.14	2049.64	0.75	1435.21
6797.00	31.08	113.540	6175.69	-944.99	2092.24	0.42	1464.65
6886.00	31.07	112.390	6251.91	-962.91	2134.54	0.67	1493.12
6976.00	30.80	113.290	6329.11	-980.87	2177.17	0.60	1521.71
7065.00	30.85	116.370	6405.55	-1000.01	2218.55	1.77	1551.12
7155.00	30.92	117.070	6482.78	-1020.78	2259.81	0.41	1582.06
7244.00	30.96	113.510	6559.13	-1040.32	2301.17	2.06	1611.84
7334.00	30.97	111.500	6636.30	-1058.05	2343.95	1.15	1640.25
7423.00	30.84	111.110	6712.66	-1074.65	2386.53	0.27	1667.53
7513.00	30.89	112.970	6789.92	-1091.98	2429.33	1.06	1695.55
7602.00	30.97	113.970	6866.27	-1110.20	2471.28	0.58	1724.22
7691.00	30.84	114.180	6942.63	-1128.84	2513.02	0.19	1753.24
7781.00	33.97	122.610	7018.64	-1151.86	2555.28	6.10	1786.61
7870.00	39.93	135.480	7089.84	-1185.71	2596.35	10.94	1830.12
7959.00	45.84	149.100	7155.17	-1233.61	2632.88	12.32	1885.98
8000.05	49.28	153.500	7182.87	-1260.19	2647.39	11.53	1915.44
8049.00	53.58	158.180	7213.40	-1295.10	2663.00	11.53	1953.24
8138.00	62.42	163.790	7260.54	-1366.40	2687.38	11.27	2028.45
8228.00	69.47	170.430	7297.23	-1446.43	2705.56	10.33	2110.44
8317.00	75.95	173.780	7323.68	-1530.55	2717.19	8.12	2194.64
8407.00	83.56	178.060	7339.68	-1618.81	2723.44	9.66	2281.41
8496.00	90.52	179.900	7344.28	-1707.62	2725.02	8.09	2367.47
8536.00	90.41	177.900	7343.95	-1747.61	2725.78	5.00	2406.24
8585.00	90.28	175.460	7343.65	-1796.52	2728.62	5.00	2454.16
8675.00	90.46	174.900	7343.07	-1886.20	2736.18	0.65	2542.65
8764.00	90.03	176.830	7342.69	-1974.96	2742.60	2.22	2629.95
8854.00	89.94	180.600	7342.72	-2064.92	2744.62	4.19	2717.24
8943.00	90.12	183.640	7342.67	-2153.85	2741.32	3.42	2802.13
9033.00	90.09	180.720	7342.50	-2243.78	2737.90	3.24	2887.95
9122.00	90.09	179.070	7342.36	-2332.77	2738.06	1.85	2973.82
9211.00	88.80	177.900	7343.23	-2421.73	2740.42	1.96	3060.24
9301.00	88.98	181.260	7344.97	-2511.70	2741.08	3.74	3147.18
9390.00	88.95	185.630	7346.58	-2600.51	2735.73	4.91	3231.40
9479.00	88.89	183.760	7348.26	-2689.19	2728.45	2.10	3315.00
9569.00	88.83	178.930	7350.05	-2779.12	2726.34	5.37	3401.17
9658.00	89.17	181.030	7351.60	-2868.10	2726.37	2.39	3486.99
9748.00	88.92	181.340	7353.10	-2958.07	2724.51	0.44	3573.27
9838.00	88.95	179.700	7354.77	-3048.05	2723.69	1.82	3659.82
9927.00	88.98	179.730	7356.38	-3137.03	2724.13	0.05	3745.76
10016.00	89.05	179.710	7357.91	-3226.02	2724.57	0.08	3831.69
10106.00	88.92	179.150	7359.51	-3316.00	2725.46	0.64	3918.71
10195.00	88.92	178.420	7361.18	-3404.96	2727.35	0.82	4005.00
10285.00	89.08	177.680	7362.75	-3494.89	2730.41	0.84	4092.54
10374.00	90.06	178.640	7363.42	-3583.84	2733.27	1.54	4179.08
10463.00	90.06	178.570	7363.33	-3672.82	2735.44	0.08	4265.46
10553.00	90.12	179.050	7363.19	-3762.80	2737.30	0.54	4352.73
10642.00	90.00	179.360	7363.09	-3851.79	2738.54	0.37	4438.88
10732.00	90.03	179.140	7363.07	-3941.78	2739.72	0.25	4525.98
10821.00	90.52	179.010	7362.64	-4030.77	2741.15	0.57	4612.18
10911.00	90.40	178.210	7361.92	-4120.74	2743.34	0.90	4699.52

11000.00	90.58	178.480	7361.16	-4209.70	2745.91	0.36	4785.99
11090.00	90.43	178.290	7360.37	-4299.66	2748.44	0.27	4873.42
11179.00	90.46	179.350	7359.68	-4388.63	2750.28	1.19	4959.72
11269.00	90.52	181.640	7358.91	-4478.62	2749.50	2.55	5046.30
11358.00	90.15	182.350	7358.39	-4567.57	2746.40	0.90	5131.25
11448.00	90.09	181.870	7358.20	-4657.50	2743.09	0.54	5217.11
11537.00	90.12	182.850	7358.03	-4746.43	2739.42	1.10	5301.90
11627.00	89.94	182.140	7357.99	-4836.34	2735.50	0.81	5387.58
11716.00	90.15	184.310	7357.92	-4925.20	2730.50	2.45	5471.94
11805.00	90.43	186.380	7357.47	-5013.80	2722.21	2.35	5555.20
11895.00	90.77	182.920	7356.52	-5103.49	2714.91	3.86	5639.77
11984.00	90.55	180.070	7355.50	-5192.44	2712.59	3.21	5724.94
12073.00	90.62	179.950	7354.59	-5281.44	2712.58	0.16	5810.76
12163.00	90.22	179.440	7353.93	-5371.43	2713.06	0.72	5897.68
12252.00	90.15	177.860	7353.64	-5460.40	2715.15	1.78	5984.04
12341.00	90.22	176.150	7353.35	-5549.28	2719.80	1.92	6070.98
12431.00	90.25	177.390	7352.99	-5639.13	2724.87	1.38	6158.98
12520.00	89.75	178.380	7352.99	-5728.07	2728.16	1.25	6245.62
12609.00	90.06	179.040	7353.13	-5817.05	2730.16	0.82	6331.96
12699.00	89.97	177.750	7353.11	-5907.01	2732.68	1.44	6419.38
12788.00	89.82	178.590	7353.27	-5995.97	2735.52	0.96	6505.92
12877.00	89.91	178.020	7353.48	-6084.93	2738.16	0.65	6592.41
12966.00	90.18	178.650	7353.41	-6173.89	2740.74	0.77	6678.89
13056.00	90.06	178.980	7353.22	-6263.87	2742.60	0.39	6766.16
13145.00	90.00	178.910	7353.18	-6352.85	2744.24	0.10	6852.41
13235.00	90.06	180.580	7353.13	-6442.85	2744.64	1.86	6939.31
13324.00	90.09	179.000	7353.01	-6531.85	2744.97	1.78	7025.22
13413.00	89.91	176.630	7353.01	-6620.77	2748.36	2.67	7111.88
13503.00	89.94	177.650	7353.13	-6710.66	2752.85	1.13	7199.75
13592.00	90.00	179.910	7353.18	-6799.63	2754.75	2.54	7286.06
13681.00	90.46	182.990	7352.82	-6888.59	2752.50	3.50	7371.26
13771.00	90.49	183.670	7352.07	-6978.44	2747.27	0.76	7456.52
13860.00	90.37	182.060	7351.41	-7067.32	2742.82	1.81	7541.07
13949.00	90.43	180.180	7350.79	-7156.30	2741.08	2.11	7626.41
14039.00	90.55	180.450	7350.02	-7246.29	2740.59	0.33	7713.07
14129.00	90.49	179.820	7349.20	-7336.29	2740.37	0.70	7799.81
14218.00	90.49	180.150	7348.44	-7425.29	2740.40	0.37	7885.64
14307.00	90.49	179.430	7347.68	-7514.28	2740.72	0.81	7971.56
14397.00	90.52	179.200	7346.88	-7604.27	2741.80	0.26	8058.63
14486.00	90.43	178.510	7346.15	-7693.25	2743.58	0.78	8144.91
14576.00	90.55	178.320	7345.38	-7783.21	2746.07	0.25	8232.33
14665.00	90.37	180.160	7344.66	-7872.20	2747.25	2.08	8318.46
14754.00	90.28	181.040	7344.16	-7961.19	2746.32	0.99	8404.03
14844.00	90.46	179.760	7343.58	-8051.19	2745.69	1.44	8490.66
14933.00	89.97	181.900	7343.24	-8140.17	2744.40	2.47	8576.13
15022.00	90.12	182.450	7343.17	-8229.11	2741.02	0.64	8661.01
15112.00	90.03	181.760	7343.05	-8319.04	2737.71	0.77	8746.87
15201.00	89.88	180.980	7343.12	-8408.02	2735.59	0.89	8832.12
15291.00	89.97	180.740	7343.24	-8498.01	2734.24	0.28	8918.54
15380.00	89.88	179.380	7343.36	-8587.01	2734.14	1.53	9004.35
15469.00	89.94	178.940	7343.50	-8676.00	2735.45	0.50	9090.52
15559.00	89.91	179.300	7343.62	-8765.98	2736.83	0.40	9177.67
15648.00	89.97	179.000	7343.71	-8854.97	2738.15	0.34	9263.84
15738.00	89.91	180.690	7343.80	-8944.97	2738.39	1.88	9350.69
15827.00	90.03	180.970	7343.85	-9033.96	2737.10	0.34	9436.18
15917.00	90.09	180.890	7343.76	-9123.95	2735.64	0.11	9522.57
16006.00	89.51	179.070	7344.07	-9212.94	2735.67	2.15	9608.41
16095.00	89.51	178.650	7344.83	-9301.92	2737.44	0.47	9694.69
16185.00	88.43	177.680	7346.44	-9391.86	2740.33	1.61	9782.19
16274.00	88.49	177.260	7348.84	-9480.74	2744.25	0.48	9868.94
16363.00	88.40	177.730	7351.25	-9569.62	2748.14	0.54	9955.69
16453.00	88.55	179.470	7353.65	-9659.56	2750.34	1.94	10043.00
16542.00	88.40	179.570	7356.02	-9748.53	2751.09	0.20	10129.00
16632.00	88.55	179.890	7358.41	-9838.49	2751.51	0.39	10215.87
16721.00	88.43	179.900	7360.76	-9927.46	2751.67	0.14	10301.72
16738.00	88.44	179.890	7361.22	-9944.46	2751.70	0.09	10318.12
16766.00	88.46	179.880	7361.98	-9972.45	2751.76	0.09	10345.12
16805.00	88.49	179.860	7363.01	-10011.43	2751.85	0.09	10382.75
16820.00	88.49	179.860	7363.41	-10026.43	2751.88	==>	10397.22
16829.00	88.49	179.860	7363.65	-10035.42	2751.91	==>	10405.90

Comments

MD[ft]	TVD[ft]	North[ft]	East[ft]	Comment
8000.05	7182.87	-1260.19	2647.39	460 Setback: 8000 / 7183 MD/TVD, 460 FNL, 1809 FWL Sec 02
8536.00	7343.95	-1747.61	2725.78	Top Perf: 8536 / 7344 MD/TVD, 947 FNL, 1885 FWL Sec 02

16738.00	7361.22	-9944.46	2751.70	Btm Perf: 16,738 / 7361 MD/TVD, 1124 FSL, 1876 FWL Sec 11
16766.00	7361.98	-9972.45	2751.76	Base Toe Sub: 16,766 / 7362 MD/TVD, 1096 FSL, 1876 FWL Sec 11
16820.00	7363.41	-10026.43	2751.88	5.5" Float Collar: 16,820 / 7363 MD/TVD, 1042 FSL, 1876 FWL Sec 11
16829.00	7363.65	-10035.42	2751.91	5.5" Csg Shoe: 16,829 / 7364 MD/TVD, 1033 FSL, 1876 FWL Sec 11
16829.00	7363.65	-10035.42	2751.91	BHL: 16,829 / 7364 MD/TVD, 1033 FSL, 1876 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	1733.00	1732.81	0.64	-20.37
8.500	1733.00	1732.81	0.64	-20.37	16829.00	7363.65	-10035.42	2751.91

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	1733.00	1732.81	0.64	-20.37
5 1/2in Casing	0.00	0.00	0.00	0.00	16829.00	7363.65	-10035.42	2751.91

Survey Tool Program

Reference	Survey Name	MD[ft]	TVD[ft]	Survey Tool	Error Model
311394	As Drilled - 20171114	16829.00	7363.65	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 0.00 0.00 on azimuth 164.670 degrees
 Bottom hole distance is 10405.90 Feet on azimuth 164.67 degrees from Wellhead
 Calculation method uses Minimum Curvature method
 Prepared by Great Western Operating Co.
 Date Printed: