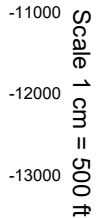


Location	Colorado	Slot	Slot W16 - Marcus LD 11-376HNX
Field	Wattenburg	Well	Marcus LD 11-376HNX
Installation	Marcus	Wellbore	Marcus LD 11-376HNX (AWB)

Plot reference is Marcus LD 11-376HNX (AWB).
 Ref wellpath is Marcus LD 11-376HNX (AWP#1).
 Coordinates are in Feet reference Slot W16 - Marcus LD 11-376HNX
 True Vertical Depths are reference Rig Datum.
 Measured Depths are reference Rig Datum.
 Rig Datum: Actual Datum #1
 Rig Datum to Mean Sea Level: 5062.00 ft.
 Plot North is aligned to TRUE North.



Great Western Operating Co, LLC
Wellbore Survey Report
Wellpath: Marcus LD 11-376HNX (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-9-2017	Mar-15-2018	05-123-45385	Marcus LD 11-376HNX (AWB)

Slot Coordinates

Latitude	Longitude
40.00261700	-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
20.00	0.00	108.760	20.00	0.00	0.00	==>	0.00
116.50	0.26	108.760	116.50	-0.07	0.21	0.27	0.12
212.50	0.97	115.260	212.49	-0.49	1.15	0.74	0.73
307.50	0.44	109.810	307.49	-0.95	2.22	0.56	1.43
402.50	0.79	98.210	402.48	-1.17	3.21	0.39	1.86
495.50	0.70	80.810	495.47	-1.17	4.41	0.26	2.13
591.50	0.75	57.250	591.47	-0.74	5.51	0.31	1.96
687.50	0.88	124.220	687.46	-0.81	6.65	0.94	2.28
782.50	0.97	98.210	782.45	-1.34	8.05	0.45	3.11
878.50	1.23	128.800	878.43	-2.10	9.66	0.66	4.21
974.50	0.74	60.500	974.42	-2.44	11.00	1.23	4.85
1070.50	1.14	82.130	1070.40	-2.00	12.49	0.55	4.75
1166.50	0.22	120.620	1166.40	-1.97	13.59	1.02	4.97
1261.50	0.40	57.780	1261.40	-1.88	14.03	0.38	4.98
1357.50	0.44	35.190	1357.39	-1.40	14.52	0.18	4.63
1451.50	1.19	87.750	1451.38	-1.07	15.71	1.05	4.57
1546.50	0.62	55.500	1546.37	-0.74	17.12	0.78	4.56
1640.50	1.14	66.750	1640.36	-0.08	18.39	0.58	4.21
1686.50	0.92	84.940	1686.35	0.13	19.18	0.85	4.18
1797.00	0.85	99.480	1796.84	0.07	20.87	0.21	4.61
1887.00	3.28	127.000	1886.78	-1.59	23.59	2.84	6.84
1976.00	6.03	138.600	1975.48	-6.63	28.72	3.25	12.90
2065.00	8.14	139.970	2063.79	-14.96	35.86	2.38	22.62
2154.00	10.23	138.370	2151.65	-25.69	45.16	2.37	35.17
2244.00	13.13	137.490	2239.77	-39.20	57.38	3.23	51.08
2333.00	16.16	142.960	2325.88	-56.55	71.68	3.74	71.18
2422.00	18.53	142.770	2410.82	-77.70	87.70	2.66	95.39
2511.00	21.16	133.890	2494.55	-100.10	107.84	4.49	121.74
2601.00	23.74	129.670	2577.73	-122.93	133.50	3.38	149.74
2690.00	26.38	127.700	2658.34	-146.46	162.94	3.11	179.28
2779.00	28.78	125.500	2737.23	-171.00	196.03	2.93	210.61
2869.00	29.70	126.220	2815.76	-196.76	231.65	1.09	243.70
2958.00	30.21	127.490	2892.87	-223.41	267.21	0.91	277.65
3048.00	29.78	130.030	2970.82	-251.57	302.29	1.49	312.96
3137.00	30.10	130.860	3047.94	-280.39	336.09	0.59	348.63
3227.00	30.30	129.800	3125.73	-309.68	370.60	0.63	384.92
3316.00	30.20	125.900	3202.62	-337.18	405.99	2.21	419.65
3405.00	30.12	124.280	3279.57	-362.89	442.57	0.92	452.91
3494.00	30.05	126.580	3356.58	-388.75	478.92	1.30	486.26
3584.00	29.94	129.900	3434.53	-416.58	514.25	1.85	521.31
3673.00	30.01	128.280	3511.63	-444.62	548.76	0.91	556.37
3762.00	30.11	124.870	3588.66	-471.17	584.55	1.92	590.28
3852.00	29.35	120.750	3666.83	-495.36	622.03	2.42	622.25
3941.00	29.34	125.680	3744.42	-519.23	658.49	2.71	653.70
4031.00	29.38	129.800	3822.87	-546.23	693.37	2.24	687.83
4120.00	30.30	130.480	3900.07	-574.78	727.22	1.10	723.24
4209.00	30.19	130.820	3976.95	-603.98	761.23	0.23	759.33
4299.00	29.87	133.810	4054.87	-634.29	794.53	1.70	796.34

4388.00	30.35	132.910	4131.86	-664.94	826.99	0.74	833.49
4477.00	29.66	131.940	4208.94	-694.97	859.84	0.95	870.12
4566.00	30.38	131.470	4286.00	-724.59	893.09	0.85	906.44
4656.00	30.28	126.270	4363.69	-753.09	928.44	2.92	942.14
4745.00	30.37	121.830	4440.53	-778.23	965.65	2.52	974.99
4834.00	30.35	122.410	4517.32	-802.15	1003.75	0.33	1006.84
4924.00	30.29	126.300	4595.02	-827.77	1041.24	2.18	1040.23
5013.00	29.58	129.080	4672.15	-854.91	1076.38	1.75	1074.56
5103.00	30.07	134.490	4750.24	-884.72	1109.72	3.04	1111.08
5192.00	30.05	131.420	4827.28	-915.09	1142.33	1.73	1147.99
5282.00	30.09	127.360	4905.17	-943.69	1177.17	2.26	1183.68
5371.00	30.38	124.160	4982.07	-969.87	1213.53	1.84	1217.35
5461.00	30.09	122.120	5059.83	-994.65	1251.47	1.19	1250.00
5550.00	30.15	120.800	5136.81	-1017.95	1289.56	0.75	1281.26
5640.00	30.05	122.550	5214.68	-1041.65	1327.97	0.98	1312.97
5729.00	30.11	126.640	5291.70	-1066.97	1364.67	2.30	1345.87
5818.00	30.01	129.010	5368.73	-1094.30	1399.88	1.34	1380.40
5908.00	30.15	128.740	5446.61	-1122.61	1435.00	0.22	1415.87
5997.00	30.01	129.400	5523.63	-1150.72	1469.63	0.40	1451.03
6087.00	30.11	131.950	5601.52	-1180.10	1503.81	1.42	1487.33
6177.00	30.08	133.040	5679.39	-1210.59	1537.09	0.61	1524.50
6266.00	29.97	133.650	5756.45	-1241.15	1569.47	0.36	1561.55
6355.00	29.95	134.480	5833.56	-1272.06	1601.41	0.47	1598.84
6365.50	29.97	134.490	5842.65	-1275.74	1605.15	0.17	1603.26
6445.00	30.10	134.550	5911.48	-1303.64	1633.52	0.17	1636.81
6534.00	29.92	134.320	5988.55	-1334.80	1665.31	0.24	1674.31
6624.00	30.04	134.380	6066.51	-1366.24	1697.46	0.14	1712.16
6713.00	30.00	132.910	6143.57	-1396.97	1729.68	0.83	1749.33
6802.00	29.96	131.230	6220.66	-1426.76	1762.69	0.94	1785.77
6891.00	30.01	128.370	6297.75	-1455.23	1796.86	1.61	1821.17
6981.00	30.39	126.990	6375.54	-1482.90	1832.69	0.88	1856.17
7070.00	30.42	126.760	6452.30	-1509.93	1868.72	0.14	1890.60
7160.00	29.94	129.770	6530.10	-1537.93	1904.24	1.76	1925.85
7249.00	30.40	131.620	6607.05	-1567.10	1938.14	1.17	1961.88
7339.00	30.40	131.580	6684.67	-1597.33	1972.20	0.02	1998.99
7428.00	30.41	134.100	6761.44	-1627.95	2005.22	1.43	2036.23
7518.00	30.41	132.540	6839.06	-1659.21	2038.37	0.88	2074.12
7607.00	30.32	130.030	6915.85	-1688.89	2072.16	1.43	2110.63
7697.00	30.16	129.580	6993.60	-1717.90	2106.99	0.31	2146.72
7786.00	34.26	140.580	7068.96	-1751.55	2140.17	8.02	2186.94
7875.00	41.17	150.970	7139.39	-1796.61	2170.36	10.53	2237.63
7965.00	50.01	156.790	7202.34	-1854.34	2198.39	10.85	2300.18
8054.00	57.12	162.070	7255.18	-1921.35	2223.37	9.30	2371.08
8143.00	67.32	166.230	7296.62	-1997.01	2244.71	12.18	2449.60
8233.00	77.15	170.800	7324.06	-2080.89	2261.66	11.94	2535.15
8322.00	81.16	175.290	7340.81	-2167.62	2272.22	6.70	2622.03
8412.00	90.06	179.710	7347.70	-2257.16	2276.11	11.03	2710.16
8416.00	90.06	179.750	7347.70	-2261.16	2276.13	1.00	2714.07
8501.00	90.00	180.600	7347.65	-2346.16	2275.87	1.00	2796.84
8591.00	90.09	181.370	7347.58	-2436.14	2274.32	0.86	2884.19
8680.00	90.12	181.770	7347.42	-2525.11	2271.88	0.45	2970.34
8769.00	90.06	181.330	7347.28	-2614.08	2269.47	0.50	3056.50
8859.00	90.03	181.330	7347.21	-2704.05	2267.38	0.03	3143.72
8948.00	90.06	181.250	7347.14	-2793.03	2265.38	0.10	3229.98
9038.00	89.66	181.090	7347.36	-2883.01	2263.54	0.48	3317.25
9127.00	89.54	181.900	7347.98	-2971.98	2261.22	0.92	3403.43
9217.00	89.60	181.090	7348.66	-3061.94	2258.87	0.90	3490.58
9306.00	89.54	179.390	7349.32	-3150.94	2258.50	1.91	3577.22
9395.00	89.51	177.200	7350.06	-3239.89	2261.15	2.46	3664.50
9485.00	89.75	176.890	7350.64	-3329.77	2265.79	0.44	3753.13
9574.00	89.54	177.640	7351.19	-3418.66	2270.03	0.88	3840.71
9664.00	89.63	178.430	7351.85	-3508.61	2273.12	0.88	3929.06
9753.00	89.57	179.600	7352.47	-3597.59	2274.65	1.32	4016.12
9842.00	89.54	181.040	7353.16	-3686.58	2274.15	1.62	4102.73
9932.00	89.35	181.420	7354.03	-3776.56	2272.22	0.47	4189.98
10021.00	89.45	184.210	7354.96	-3865.44	2267.85	3.14	4275.62
10111.00	89.54	184.340	7355.76	-3955.18	2261.14	0.18	4361.57
10200.00	89.57	183.720	7356.45	-4043.96	2254.89	0.70	4446.68
10290.00	89.60	181.830	7357.10	-4133.85	2250.53	2.10	4533.30
10379.00	90.09	179.350	7357.34	-4222.84	2249.61	2.84	4619.82
10469.00	89.85	178.480	7357.39	-4312.82	2251.32	1.00	4707.89
10558.00	89.94	178.350	7357.55	-4401.78	2253.78	0.18	4795.14
10648.00	89.42	178.420	7358.05	-4491.75	2256.32	0.58	4883.38
10737.00	89.51	178.490	7358.88	-4580.71	2258.72	0.13	4970.62
10826.00	89.48	178.440	7359.67	-4669.68	2261.10	0.07	5057.85

10916.00	89.45	180.150	7360.51	-4759.66	2262.21	1.90	5145.79
11006.00	89.60	179.950	7361.26	-4849.66	2262.13	0.28	5233.48
11095.00	89.51	179.300	7361.95	-4938.65	2262.71	0.74	5320.34
11184.00	89.48	179.170	7362.73	-5027.64	2263.90	0.15	5407.32
11274.00	89.97	178.810	7363.16	-5117.63	2265.49	0.68	5495.37
11363.00	90.06	180.070	7363.14	-5206.62	2266.36	1.42	5582.29
11453.00	90.06	180.960	7363.05	-5296.62	2265.55	0.99	5669.81
11542.00	90.09	180.790	7362.93	-5385.61	2264.19	0.19	5756.23
11632.00	90.18	179.380	7362.72	-5475.60	2264.05	1.57	5843.91
11721.00	89.91	177.990	7362.65	-5564.58	2266.10	1.59	5931.07
11811.00	90.12	177.310	7362.62	-5654.50	2269.79	0.79	6019.53
11900.00	90.06	179.170	7362.48	-5743.45	2272.52	2.09	6106.83
11989.00	90.03	178.850	7362.41	-5832.44	2274.06	0.36	6193.90
12079.00	90.00	177.210	7362.39	-5922.39	2277.15	1.82	6282.24
12168.00	90.03	176.820	7362.37	-6011.26	2281.79	0.44	6369.90
12257.00	90.86	176.610	7361.68	-6100.11	2286.89	0.96	6457.63
12347.00	89.88	177.190	7361.09	-6189.98	2291.75	1.27	6546.29
12436.00	89.91	178.450	7361.26	-6278.91	2295.14	1.42	6633.72
12526.00	89.48	178.630	7361.74	-6368.88	2297.43	0.52	6721.91
12615.00	89.45	179.260	7362.57	-6457.86	2299.07	0.71	6808.99
12704.00	89.51	179.600	7363.38	-6546.85	2299.96	0.39	6895.92
12793.00	89.45	180.170	7364.18	-6635.85	2300.13	0.64	6982.68
12883.00	89.54	180.850	7364.98	-6725.84	2299.33	0.76	7070.20
12972.00	89.42	181.750	7365.78	-6814.82	2297.31	1.02	7156.46
13061.00	89.51	181.480	7366.62	-6903.78	2294.81	0.32	7242.59
13151.00	89.48	181.780	7367.41	-6993.74	2292.25	0.33	7329.68
13240.00	89.82	180.220	7367.95	-7082.72	2290.69	1.79	7416.05
13329.00	90.09	179.190	7368.02	-7171.72	2291.15	1.20	7502.88
13419.00	89.91	179.430	7368.02	-7261.71	2292.24	0.33	7590.83
13508.00	90.00	179.340	7368.09	-7350.70	2293.19	0.14	7677.77
13598.00	90.68	179.160	7367.56	-7440.69	2294.37	0.78	7765.73
13687.00	90.77	179.590	7366.43	-7529.68	2295.34	0.49	7852.67
13776.00	90.37	180.490	7365.55	-7618.68	2295.28	1.11	7939.38
13866.00	90.83	181.530	7364.60	-7708.66	2293.69	1.26	8026.71
13955.00	90.83	181.240	7363.31	-7797.62	2291.54	0.33	8112.93
14044.00	90.74	180.950	7362.10	-7886.60	2289.84	0.34	8199.25
14134.00	90.83	181.000	7360.86	-7976.57	2288.31	0.11	8286.60
14223.00	90.43	180.500	7359.88	-8065.56	2287.14	0.72	8373.05
14312.00	90.58	181.100	7359.10	-8154.55	2285.90	0.69	8459.50
14402.00	90.40	180.390	7358.33	-8244.54	2284.73	0.81	8546.93
14491.00	90.49	180.370	7357.64	-8333.53	2284.14	0.10	8633.52
14581.00	90.65	182.790	7356.74	-8423.49	2281.66	2.69	8720.63
14670.00	90.49	181.540	7355.86	-8512.42	2278.30	1.42	8806.54
14760.00	90.52	177.990	7355.06	-8602.40	2278.67	3.94	8894.31
14849.00	90.68	176.570	7354.13	-8691.29	2282.89	1.61	8981.89
14939.00	90.43	176.530	7353.26	-8781.12	2288.30	0.28	9070.65
15028.00	90.55	177.930	7352.50	-8870.01	2292.61	1.58	9158.24
15117.00	90.06	177.560	7352.03	-8958.94	2296.11	0.69	9245.69
15206.00	89.94	177.540	7352.03	-9047.86	2299.91	0.14	9333.19
15296.00	89.94	179.180	7352.12	-9137.82	2302.49	1.82	9421.44
15385.00	89.20	179.170	7352.79	-9226.81	2303.77	0.83	9508.45
15475.00	89.26	178.970	7354.00	-9316.79	2305.23	0.23	9596.46
15564.00	89.35	179.720	7355.08	-9405.78	2306.25	0.85	9683.41
15653.00	89.20	181.150	7356.20	-9494.76	2305.57	1.62	9769.98
15743.00	89.14	182.200	7357.51	-9584.71	2302.94	1.17	9857.05
15832.00	89.94	182.250	7358.22	-9673.64	2299.49	0.90	9942.94
15922.00	90.03	181.520	7358.24	-9763.59	2296.53	0.82	10029.93
16011.00	90.06	182.360	7358.17	-9852.54	2293.51	0.94	10115.94
16018.00	90.05	182.350	7358.17	-9859.54	2293.23	0.26	10122.69
16046.00	90.00	182.290	7358.16	-9887.51	2292.09	0.26	10149.70
16083.00	89.94	182.220	7358.17	-9924.49	2290.64	0.26	10185.40
16098.00	89.94	182.220	7358.19	-9939.47	2290.05	==>	10199.88
16107.00	89.94	182.220	7358.20	-9948.47	2289.71	==>	10208.56

Comments

MD[ft]	TVD[ft]	North[ft]	East[ft]	Comment
6365.50	5842.65	-1275.74	1605.15	460 Setback: 6366 / 5843 MD/TVD, 460 FNL, 767 FWL Sec 02
8416.00	7347.70	-2261.16	2276.13	Top Perf: 8416 / 7348 MD/TVD, 1446 FNL, 1432 FWL Sec 02
16018.00	7358.17	-9859.54	2293.23	Btm Perf: 16,018 / 7358 MD/TVD, 1231 FSL, 1417 FWL Sec 11
16046.00	7358.16	-9887.51	2292.09	Base Toe Sub: 16,046 / 7358 MD/TVD, 1203 FSL, 1416 FWL Sec 11
16098.00	7358.19	-9939.47	2290.05	5.5" Float Collar: 16,098 / 7358 MD/TVD, 1151 FSL, 1414 FWL Sec 11
16107.00	7358.20	-9948.47	2289.71	5.5" Csg Shoe: 16,107 / 7358 MD/TVD, 1142 FSL, 1414 FWL Sec 11
16107.00	7358.20	-9948.47	2289.71	BHL: 16,107 / 7358 MD/TVD, 1142 FSL, 1414 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	1737.00	1736.85	0.16	19.97
8.500	1737.00	1736.85	0.16	19.97	16107.00	7358.20	-9948.47	2289.71

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	1737.00	1736.85	0.16	19.97
5 1/2in Casing	0.00	0.00	0.00	0.00	16107.00	7358.20	-9948.47	2289.71

Survey Tool Program

Reference	Survey Name	MD[ft]	TVD[ft]	Survey Tool	Error Model
311371	As Drilled 20171109	16107.00	7358.20	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 0.00 0.00 on azimuth 167.040 degrees

Bottom hole distance is 10208.56 Feet on azimuth 167.04 degrees from Wellhead

Calculation method uses Minimum Curvature method

Prepared by Great Western Operating Co.

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