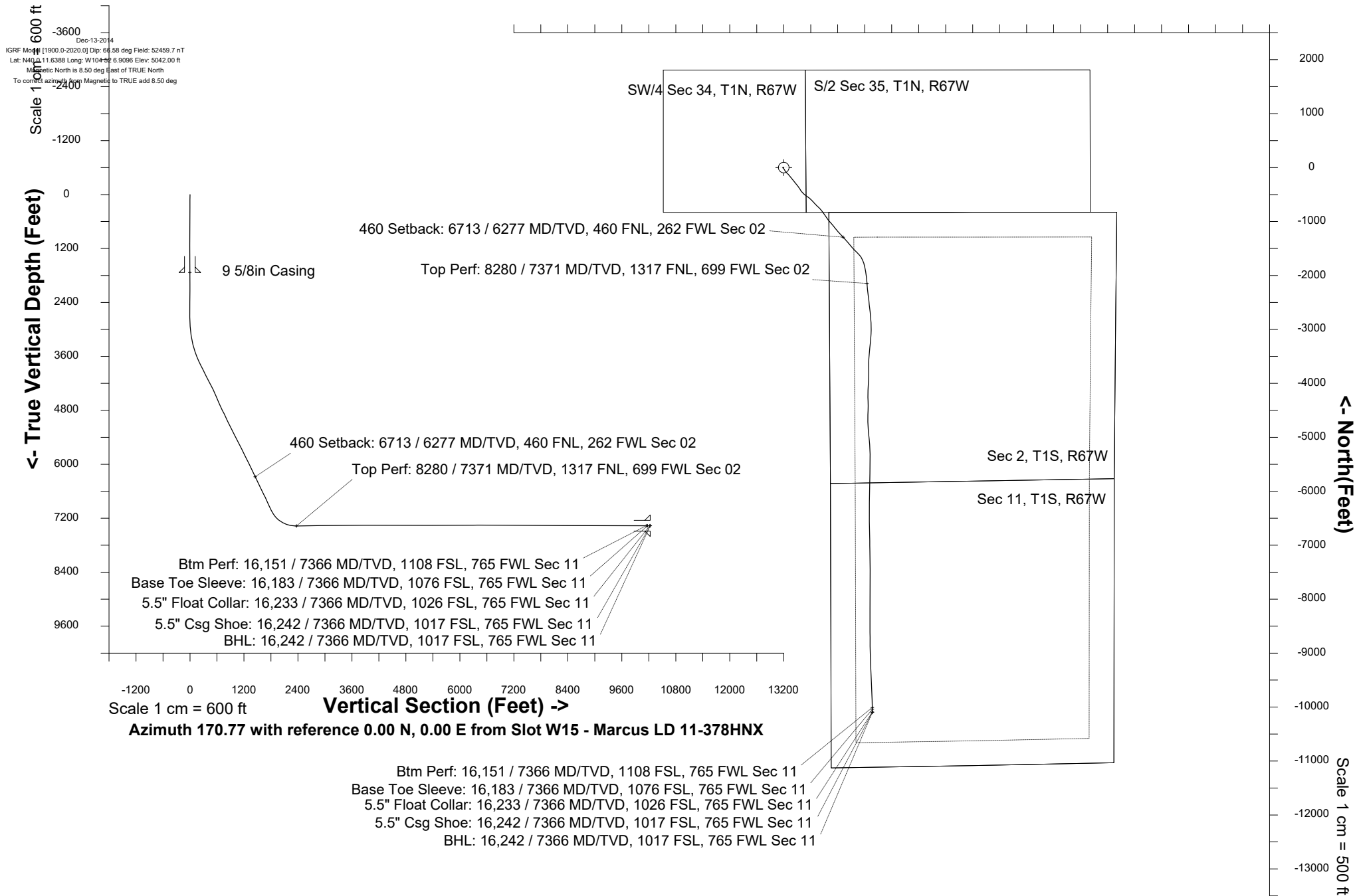


Location	Colorado	Slot	Slot W15 - Marcus LD 11-378HNX
Field	Wattenburg	Well	Marcus LD 11-378HNX
Installation	Marcus	Wellbore	Marcus LD 11-378HNX (AWB)

Plot reference is Marcus LD 11-378HNX (AWB).
 Ref wellpath is Marcus LD 11-378HNX (AWP#1).
 Coordinates are in Feet reference Slot W15 - Marcus LD 11-378HNX
 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.

East (Feet) ->



Great Western Operating Co, LLC
Wellbore Survey Report
Wellpath: Marcus LD 11-378HNX (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-7-2017	Mar-15-2018	05-123-45387	Marcus LD 11-378HNX (AWB)

Slot Coordinates

Latitude	Longitude
40.00265600	-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
11.50	0.00	8.980	11.50	0.00	0.00	==>	0.00
116.50	0.57	8.980	116.50	0.52	0.08	0.54	-0.50
212.50	1.14	289.350	212.49	1.30	-0.75	1.23	-1.41
307.50	0.40	330.030	307.48	1.90	-1.80	0.92	-2.17
402.50	1.10	247.250	402.47	1.84	-2.81	1.18	-2.27
495.50	2.11	282.140	495.44	1.85	-5.31	1.46	-2.68
591.50	0.57	302.970	591.41	2.49	-7.43	1.66	-3.65
687.50	0.70	207.960	687.41	2.23	-8.11	0.98	-3.50
782.50	1.10	248.220	782.39	1.38	-9.23	0.76	-2.84
878.50	0.66	254.370	878.38	0.89	-10.62	0.47	-2.58
974.50	1.58	278.540	974.36	0.93	-12.46	1.06	-2.92
1070.50	0.26	298.840	1070.35	1.23	-13.96	1.39	-3.46
1166.50	0.83	278.540	1166.35	1.44	-14.84	0.62	-3.80
1261.50	0.48	298.490	1261.34	1.74	-15.87	0.43	-4.26
1357.50	0.92	186.080	1357.33	1.16	-16.30	1.24	-3.76
1451.50	0.66	238.640	1451.33	0.13	-16.84	0.78	-2.83
1546.50	0.62	278.540	1546.32	-0.08	-17.82	0.46	-2.78
1640.50	0.62	251.120	1640.32	-0.17	-18.80	0.31	-2.85
1684.50	0.57	262.720	1684.31	-0.27	-19.25	0.30	-2.82
1752.00	0.50	267.840	1751.81	-0.33	-19.87	0.13	-2.86
1796.00	0.17	81.930	1795.81	-0.33	-20.00	1.52	-2.89
1886.00	0.29	153.850	1885.81	-0.51	-19.77	0.32	-2.67
1975.00	0.11	66.490	1974.81	-0.68	-19.59	0.34	-2.47
2064.00	0.58	170.800	2063.81	-1.09	-19.44	0.69	-2.04
2154.00	0.14	18.720	2153.81	-1.44	-19.33	0.79	-1.68
2243.00	0.23	129.190	2242.81	-1.45	-19.16	0.35	-1.65
2332.00	0.17	51.700	2331.81	-1.48	-18.92	0.29	-1.58
2421.00	0.50	264.390	2420.80	-1.43	-19.20	0.73	-1.67
2511.00	0.84	357.150	2510.80	-0.81	-19.62	1.11	-2.35
2600.00	0.00	8.380	2599.80	-0.16	-19.66	0.94	-2.99
2689.00	0.04	268.400	2688.80	-0.16	-19.69	0.04	-3.00
2779.00	0.34	159.560	2778.80	-0.41	-19.62	0.39	-2.74
2868.00	2.32	134.220	2867.77	-1.92	-18.24	2.27	-1.03
2957.00	4.80	136.850	2956.59	-5.89	-14.40	2.79	3.50
3047.00	7.15	139.200	3046.10	-12.88	-8.17	2.62	11.40
3136.00	10.34	139.970	3134.05	-23.19	0.59	3.59	22.98
3226.00	12.79	146.380	3222.22	-37.67	11.30	3.07	39.00
3315.00	15.71	149.920	3308.47	-56.31	22.80	3.42	59.24
3404.00	19.93	143.180	3393.19	-78.89	37.94	5.27	83.95
3494.00	20.62	133.560	3477.64	-102.10	58.62	3.78	110.18
3583.00	23.23	135.620	3560.20	-125.44	82.26	3.06	137.01
3672.00	25.62	139.110	3641.23	-152.54	107.14	3.14	167.75
3761.00	27.94	141.850	3720.68	-183.49	132.62	2.95	202.38
3851.00	30.19	143.570	3799.34	-218.28	159.08	2.67	240.97
3940.00	30.22	139.580	3876.27	-253.34	186.90	2.26	280.04
4030.00	30.14	138.330	3954.07	-287.46	216.60	0.70	318.48
4119.00	29.92	141.000	4031.13	-321.41	245.43	1.52	356.61
4209.00	29.37	144.860	4109.35	-356.90	272.26	2.21	395.95
4298.00	29.78	149.600	4186.77	-393.82	296.01	2.67	436.19

4387.00	30.29	145.120	4263.83	-431.30	320.03	2.58	477.04
4476.00	30.21	136.630	4340.74	-466.00	348.26	4.80	515.83
4566.00	30.20	129.570	4418.55	-496.89	381.27	3.94	551.61
4655.00	30.23	125.370	4495.47	-524.12	416.79	2.37	584.19
4744.00	29.50	123.970	4572.65	-549.34	453.24	1.13	614.92
4834.00	30.75	131.680	4650.52	-577.03	488.81	4.52	647.96
4923.00	30.79	138.070	4727.01	-609.12	521.04	3.67	684.80
5013.00	30.86	138.060	4804.30	-643.42	551.86	0.08	723.60
5102.00	30.95	136.770	4880.66	-677.08	582.79	0.75	761.78
5191.00	30.20	133.040	4957.29	-709.03	614.83	2.29	798.46
5281.00	30.07	132.680	5035.13	-739.77	647.95	0.25	834.11
5371.00	30.10	138.850	5113.03	-772.05	679.38	3.44	871.02
5460.00	29.60	142.900	5190.23	-806.39	707.33	2.33	909.40
5549.00	29.79	144.240	5267.54	-841.86	733.51	0.78	948.61
5639.00	29.76	144.490	5345.66	-878.19	759.55	0.14	988.64
5729.00	29.87	146.630	5423.75	-915.09	784.85	1.19	1029.12
5818.00	30.00	142.470	5500.88	-951.25	810.60	2.34	1068.94
5907.00	30.00	140.400	5577.96	-986.04	838.33	1.16	1107.73
5997.00	29.93	138.930	5655.93	-1020.30	867.43	0.82	1146.22
6086.00	29.85	139.970	5733.09	-1054.00	896.26	0.59	1184.11
6176.00	29.95	140.930	5811.11	-1088.59	924.83	0.54	1222.83
6265.00	29.95	142.450	5888.23	-1123.45	952.37	0.85	1261.66
6355.00	29.89	139.040	5966.24	-1158.20	980.76	1.89	1300.51
6444.00	29.86	138.850	6043.41	-1191.63	1009.88	0.11	1338.18
6534.00	29.88	137.730	6121.46	-1225.09	1039.70	0.62	1375.99
6623.00	29.95	137.800	6198.60	-1257.96	1069.54	0.09	1413.21
6712.00	29.84	135.080	6275.76	-1290.09	1100.10	1.53	1449.84
6713.40	29.83	135.100	6276.98	-1290.59	1100.59	1.06	1450.40
6801.00	29.19	136.460	6353.21	-1321.51	1130.68	1.06	1485.75
6891.00	29.08	140.810	6431.83	-1354.37	1159.62	2.36	1522.83
6980.00	29.87	139.100	6509.32	-1387.89	1187.80	1.30	1560.43
7069.00	29.88	140.540	6586.49	-1421.75	1216.40	0.81	1598.45
7159.00	29.96	140.550	6664.50	-1456.42	1244.93	0.09	1637.23
7249.00	29.90	136.490	6742.50	-1490.04	1274.66	2.25	1675.19
7338.00	29.82	136.680	6819.69	-1522.23	1305.11	0.14	1711.85
7428.00	29.88	134.820	6897.75	-1554.31	1336.37	1.03	1748.53
7517.00	29.84	134.070	6974.93	-1585.34	1368.00	0.42	1784.23
7607.00	30.59	137.160	7052.71	-1617.71	1399.66	1.92	1821.26
7696.00	38.36	147.090	7126.08	-1657.59	1430.14	10.75	1865.51
7785.00	45.53	154.690	7192.28	-1709.58	1458.77	9.86	1921.42
7875.00	53.56	162.330	7250.68	-1773.27	1483.55	11.00	1988.26
7964.00	61.31	168.540	7298.58	-1845.80	1502.21	10.50	2062.84
8053.00	70.12	170.880	7335.15	-1925.54	1516.63	10.18	2143.86
8143.00	79.23	173.070	7358.91	-2011.40	1528.70	10.39	2230.55
8232.00	87.57	174.330	7369.13	-2099.20	1538.39	9.48	2318.76
8280.00	88.88	175.400	7370.62	-2146.98	1542.68	3.53	2366.61
8322.00	90.03	176.340	7371.02	-2188.87	1545.70	3.53	2408.45
8411.00	90.06	173.250	7370.95	-2277.49	1553.78	3.47	2497.21
8501.00	90.03	172.250	7370.88	-2366.77	1565.13	1.11	2587.16
8590.00	91.08	174.330	7370.02	-2455.15	1575.53	2.62	2676.06
8679.00	91.11	173.980	7368.32	-2543.67	1584.59	0.39	2764.89
8769.00	91.02	172.820	7366.64	-2633.06	1594.94	1.29	2854.78
8858.00	91.11	174.080	7364.99	-2721.46	1605.09	1.42	2943.67
8948.00	91.05	176.170	7363.29	-2811.11	1612.73	2.32	3033.39
9037.00	90.98	177.490	7361.71	-2899.96	1617.65	1.48	3121.87
9127.00	91.05	180.450	7360.12	-2989.92	1619.27	3.29	3210.93
9216.00	90.95	182.290	7358.57	-3078.88	1617.14	2.07	3298.39
9305.00	91.08	184.250	7356.99	-3167.72	1612.07	2.21	3385.26
9395.00	90.09	186.930	7356.07	-3257.27	1603.30	3.17	3472.26
9484.00	90.00	185.640	7356.00	-3345.74	1593.56	1.45	3558.01
9574.00	89.85	184.110	7356.12	-3435.41	1585.91	1.71	3645.30
9663.00	90.43	184.850	7355.90	-3524.14	1578.96	1.06	3731.76
9752.00	90.80	183.290	7354.95	-3612.90	1572.64	1.80	3818.37
9842.00	89.91	176.770	7354.39	-3702.85	1572.60	7.31	3907.14
9931.00	89.91	179.850	7354.53	-3791.80	1575.22	3.46	3995.36
10021.00	90.09	182.570	7354.53	-3881.77	1573.32	3.03	4083.86
10110.00	89.45	183.580	7354.89	-3970.64	1568.55	1.34	4170.82
10200.00	89.42	182.830	7355.77	-4060.50	1563.52	0.83	4258.70
10289.00	89.23	181.500	7356.82	-4149.43	1560.15	1.51	4345.94
10379.00	89.94	178.220	7357.47	-4239.41	1560.37	3.73	4434.79
10468.00	89.94	178.230	7357.57	-4328.37	1563.13	==>	4523.04
10557.00	89.94	180.210	7357.66	-4417.35	1564.34	2.22	4611.07
10647.00	90.00	181.380	7357.71	-4507.34	1563.09	1.30	4699.70
10736.00	89.94	182.370	7357.75	-4596.30	1560.18	1.11	4787.03
10826.00	90.06	180.600	7357.75	-4686.26	1557.85	1.97	4875.46
10915.00	89.94	177.370	7357.75	-4775.24	1559.42	3.63	4963.53

11005.00	89.97	173.590	7357.82	-4864.94	1566.52	4.20	5053.21
11094.00	89.94	173.730	7357.89	-4953.40	1576.34	0.16	5142.10
11184.00	90.00	175.300	7357.94	-5042.98	1584.95	1.75	5231.90
11273.00	90.00	176.000	7357.94	-5131.72	1591.70	0.79	5320.58
11363.00	89.88	177.580	7358.04	-5221.58	1596.74	1.76	5410.08
11452.00	90.03	179.140	7358.11	-5310.54	1599.28	1.76	5498.30
11542.00	89.91	179.380	7358.15	-5400.53	1600.45	0.30	5587.31
11631.00	89.91	180.240	7358.29	-5489.53	1600.74	0.97	5675.20
11720.00	90.06	180.720	7358.32	-5578.53	1600.00	0.57	5762.93
11810.00	90.46	181.370	7357.91	-5668.51	1598.35	0.85	5851.48
11899.00	90.49	183.430	7357.17	-5757.43	1594.63	2.31	5938.65
11989.00	90.37	181.910	7356.49	-5847.32	1590.44	1.69	6026.71
12078.00	90.43	180.230	7355.87	-5936.30	1588.77	1.89	6114.27
12167.00	90.46	179.290	7355.18	-6025.30	1589.15	1.06	6202.17
12257.00	90.43	180.280	7354.48	-6115.29	1589.48	1.10	6291.06
12346.00	90.43	181.040	7353.81	-6204.28	1588.46	0.85	6378.73
12435.00	89.69	181.220	7353.72	-6293.27	1586.70	0.86	6466.28
12525.00	89.78	180.290	7354.14	-6383.26	1585.52	1.04	6554.92
12614.00	89.94	179.520	7354.35	-6472.25	1585.67	0.88	6642.79
12703.00	89.88	179.610	7354.49	-6561.25	1586.34	0.12	6730.74
12793.00	89.32	178.590	7355.12	-6651.24	1587.75	1.29	6819.79
12882.00	89.08	178.540	7356.37	-6740.20	1589.98	0.28	6907.96
12971.00	89.14	179.060	7357.75	-6829.17	1591.85	0.59	6996.07
13061.00	89.29	178.970	7358.98	-6919.15	1593.39	0.19	7085.14
13150.00	89.14	179.120	7360.20	-7008.13	1594.88	0.24	7173.20
13239.00	90.06	179.620	7360.82	-7097.12	1595.86	1.18	7261.20
13329.00	90.12	179.580	7360.68	-7187.12	1596.48	0.08	7350.13
13418.00	90.12	179.330	7360.49	-7276.11	1597.33	0.28	7438.11
13507.00	90.00	179.230	7360.40	-7365.10	1598.45	0.18	7526.13
13597.00	90.15	179.400	7360.28	-7455.10	1599.52	0.25	7615.13
13686.00	90.06	179.330	7360.12	-7544.09	1600.51	0.13	7703.13
13776.00	90.12	179.800	7359.98	-7634.09	1601.19	0.53	7792.07
13865.00	90.00	180.330	7359.89	-7723.09	1601.09	0.61	7879.90
13954.00	90.09	180.630	7359.82	-7812.09	1600.35	0.35	7967.63
14044.00	90.06	180.520	7359.70	-7902.08	1599.44	0.13	8056.31
14133.00	90.06	180.630	7359.60	-7991.08	1598.55	0.12	8144.01
14222.00	90.12	180.060	7359.46	-8080.07	1598.02	0.64	8231.77
14312.00	90.12	180.340	7359.28	-8170.07	1597.70	0.31	8320.56
14401.00	89.48	180.210	7359.59	-8259.07	1597.27	0.73	8408.33
14491.00	89.42	179.990	7360.45	-8349.07	1597.12	0.25	8497.14
14580.00	89.45	179.840	7361.33	-8438.06	1597.25	0.17	8585.00
14670.00	89.29	179.650	7362.32	-8528.06	1597.65	0.28	8673.90
14759.00	89.35	179.250	7363.37	-8617.05	1598.50	0.45	8761.87
14848.00	89.45	179.380	7364.31	-8706.03	1599.57	0.18	8849.88
14938.00	89.75	179.980	7364.93	-8796.03	1600.07	0.75	8938.79
15027.00	89.91	180.490	7365.20	-8885.03	1599.71	0.60	9026.58
15116.00	90.00	179.410	7365.27	-8974.03	1599.78	1.22	9114.44
15206.00	89.94	177.720	7365.32	-9064.00	1602.04	1.88	9203.60
15295.00	89.94	176.460	7365.41	-9152.88	1606.56	1.42	9292.06
15384.00	89.97	175.750	7365.48	-9241.67	1612.60	0.80	9380.67
15474.00	89.94	176.760	7365.55	-9331.48	1618.48	1.12	9470.26
15563.00	90.03	178.680	7365.57	-9420.41	1622.02	2.16	9558.60
15653.00	89.88	179.010	7365.64	-9510.39	1623.83	0.40	9647.71
15742.00	89.94	178.400	7365.78	-9599.36	1625.85	0.69	9735.86
15831.00	90.00	178.190	7365.83	-9688.32	1628.49	0.25	9824.09
15921.00	89.91	177.160	7365.90	-9778.25	1632.14	1.15	9913.44
16010.00	89.85	177.510	7366.09	-9867.15	1636.28	0.40	10001.85
16100.00	89.85	177.840	7366.32	-9957.08	1639.93	0.37	10091.20
16151.00	89.92	178.960	7366.43	-10008.06	1641.36	2.21	10141.75
16183.00	89.96	179.670	7366.46	-10040.05	1641.74	2.21	10173.39
16189.00	89.97	179.800	7366.46	-10046.05	1641.77	2.21	10179.32
16218.00	89.97	181.170	7366.48	-10075.05	1641.52	4.72	10207.90
16233.00	89.97	181.170	7366.49	-10090.05	1641.21	==>	10222.66
16242.00	89.97	181.170	7366.49	-10099.05	1641.03	==>	10231.51

Comments

MD[ft]	TVD[ft]	North[ft]	East[ft]	Comment
6713.40	6276.98	-1290.59	1100.59	460 Setback: 6713 / 6277 MD/TVD, 460 FNL, 262 FWL Sec 02
8280.00	7370.62	-2146.98	1542.68	Top Perf: 8280 / 7371 MD/TVD, 1317 FNL, 699 FWL Sec 02
16151.00	7366.43	-10008.06	1641.36	Btm Perf: 16,151 / 7366 MD/TVD, 1108 FSL, 765 FWL Sec 11
16183.00	7366.46	-10040.05	1641.74	Base Toe Sleeve: 16,183 / 7366 MD/TVD, 1076 FSL, 765 FWL Sec 11
16233.00	7366.49	-10090.05	1641.21	5.5" Float Collar: 16,233 / 7366 MD/TVD, 1026 FSL, 765 FWL Sec 11
16242.00	7366.49	-10099.05	1641.03	5.5" Csg Shoe: 16,242 / 7366 MD/TVD, 1017 FSL, 765 FWL Sec 11
16242.00	7366.49	-10099.05	1641.03	BHL: 16,242 / 7366 MD/TVD, 1017 FSL, 765 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	1735.00	1734.81	-0.32	-19.72
8.500	1735.00	1734.81	-0.32	-19.72	16242.00	7366.49	-10099.05	1641.03

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	1735.00	1734.81	-0.32	-19.72
5 1/2in Casing	0.00	0.00	0.00	0.00	16242.00	7366.49	-10099.05	1641.03

Survey Tool Program

Reference	Survey Name	MD[ft]	TVD[ft]	Survey Tool	Error Model
310600	As Drilled 20171107	16242.00	7366.49	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 170.770 degrees
 Bottom hole distance is 10231.51 Feet on azimuth 170.77 degrees from Wellhead
 Calculation method uses Minimum Curvature method
 Prepared by Great Western Operating Co.
 Date Printed: