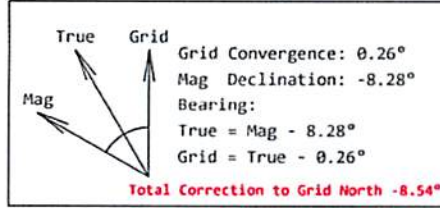




Thurman Speece BRK 1H
 Brooke County, WV
 SDC 41
Plan vs Actual



Plan Data for Thurman Speece BRK 1H

Plan Point Information:
 DogLeg Severity Unit: °/100.00ft Position offsets from Slot centre

MD	Inc	Az	TVD	+N/-S	+E/-W	VSec	DLS	Toolface	Comments
(USft)	(°)	(°)	(USft)	(USft)	(USft)	(USft)	(DLSU)	(°)	(°)
5008.00	4.42	252.51	4991.22	-47.19	-363.79	118.52	0.76	340.4	Last WFT SVY
5105.00	4.42	252.51	5087.94	-49.43	-370.92	119.66	0.00	0.0	PTB
5173.24	4.42	252.51	5155.97	-51.01	-375.94	120.46	0.00	0.0	Curve KOP 7° DLS
6161.06	70.00	330.59	5911.33	397.69	-677.70	656.34	7.00	79.7	Build/Turn 9° DLS
6344.65	85.00	337.71	5951.00	558.56	-755.28	834.93	9.00	25.7	Landing Point
6488.51	90.75	337.71	5956.33	691.53	-809.79	978.30	4.00	0.0	Hold
12587.54	90.75	337.71	5876.00	6334.32	-3122.92	7062.31	0.00	0.0	PBHL TS1H

Target Set Information:
 Name: Thurman Speece BRK 1H
 Position offsets from Slot centre

Name	TVD	+N/-S	+E/-W	Northing	Easting	Lat	Long
(USft)	(USft)	(USft)	(USft)	(USft)	(USft)	(°)	(°)
LP TS1H	5951.00	449.57	-710.60	14596479.56	1754165.21	40.190816	-80.592694
PBHL TS1H	5876.00	6334.32	-3122.92	14602364.31	1751752.89	40.207006	-80.601237



Drawing By: Gary Rhodes Date: 10 October 2017
 Office Name: MidCon DS
 Address: 7725 W. Reno Ave, Ste. #220
 Oklahoma City, OK 73127
 Phone: +1.405.720.4257

Plan Data for Thurman Speece BRK 1H

Field: SOUTHWESTERN_BROOKE CO, WV UTM NAD 83 (17N)
 Map Unit: USft Vertical Reference Datum (VRD):
 Projected Coordinate System: NAD83 / UTM zone 17N

Site: Thurman Speece BRK Pad
 Unit: USFeet TVD Reference:
 Company Name: SOUTHWESTERN ENERGY

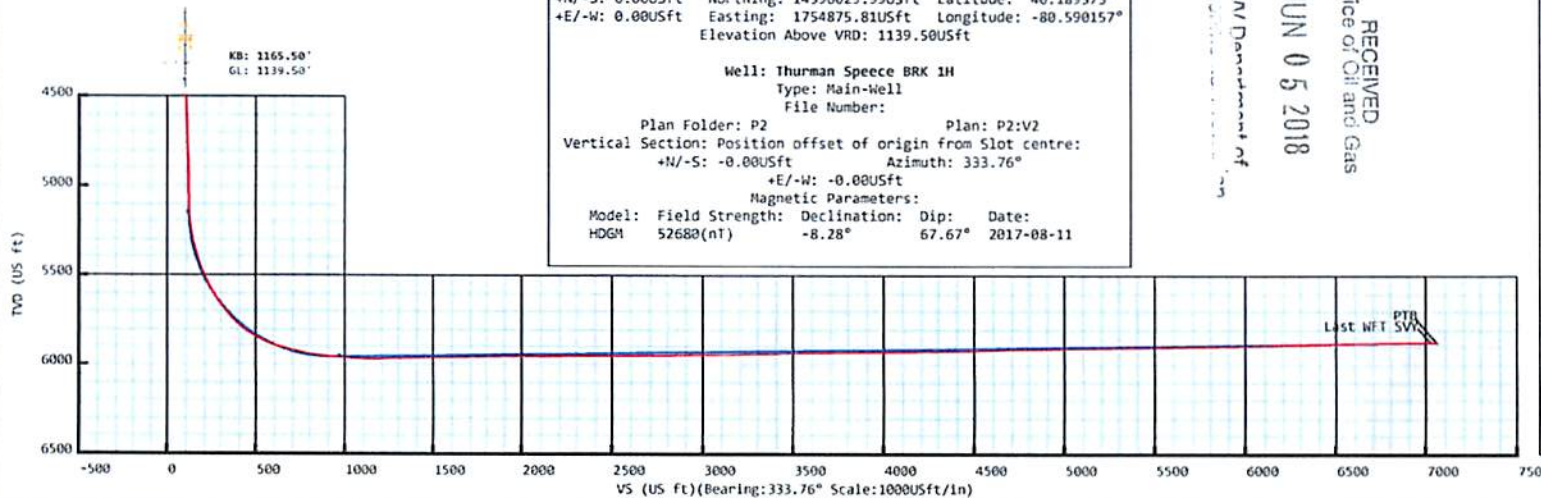
Position:
 Northing: 14596029.99USft Latitude: 40.189573°
 Easting: 1754875.81USft Longitude: -80.590157°
 North Reference: Grid Grid Convergence: 0.26°
 Elevation Above VRD: 1139.50USft

Slot: Thurman Speece BRK 1H
 Position:
 Offset is from Site centre
 +N/-S: 0.00USft Northing: 14596029.99USft Latitude: 40.189573°
 +E/-W: 0.00USft Easting: 1754875.81USft Longitude: -80.590157°
 Elevation Above VRD: 1139.50USft

Well: Thurman Speece BRK 1H
 Type: Main-Well
 File Number:

Plan Folder: P2 Plan: P2:V2
 Vertical Section: Position offset of origin from Slot centre:
 +N/-S: -0.00USft Azimuth: 333.76°
 +E/-W: -0.00USft

Magnetic Parameters:
 Model: Field Strength: Declination: Dip: Date:
 HDGM 52680(nT) -8.28° 67.67° 2017-08-11



Plan Data for Thurman Speece BRK 1H

Formation Point Information:

Name	TVD	SS	MD
(USft)	(USft)	(USft)	(USft)
Onondaga Limestone	-4824.00	0.00	-1.00
Base of Fresh Water	263.50	902.00	263.51
Pittsburgh Coal	342.50	823.00	342.51
Top of Salt Water	474.50	691.00	474.51
Maxton	1114.50	51.00	1114.90
Big Lime	1349.50	-184.00	1351.25
Big Injun	1573.50	-408.00	1576.91
Base Big Injun	1649.50	-484.00	1653.20
Berea	1972.50	-807.00	1977.18
Upper Rhinestreet	5418.50	-4253.00	5441.69
Lower Rhinestreet	5525.50	-4360.00	5558.88
Basal Rhinestreet	5586.50	-4421.00	5629.66
Cashaqua	5656.50	-4491.00	5716.12
Middlesex	5706.50	-4541.00	5782.60
Lower Middlesex	5730.50	-4565.00	5816.36
Burket	5768.50	-4603.00	5873.00
Tully	5784.50	-4619.00	5898.25
Mahantango	5838.50	-4673.00	5992.09
Levanna	5937.50	-4772.00	6249.37
Upper Marcellus	5947.50	-4782.00	6303.22

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SURVEY REPORT

Report Date: 10/13/2017
 Customer: SWN Production Co., LLC Field: Panhandle
 Job Name: NE-12791099 Rig: SDC 41
 Well Name: Thurman Speece BRK 1H Rig Loc: Brooke Co., WV

Survey Calculation Method: Minimum Curvature						
Magnetic Reference	Target Direction	Total Magnetic Field	Magnetic Dip Angle	Magnetic Declination	Grid Convergence	Total Correction
Grid North	333.76 deg	52663 nT	67.65 deg	-8.28 deg	0.26 deg	-8.54 deg
Survey Tie-On	Depth	INC	AZ	TVD	NS	EW
	0.00 ft	0.00 deg	0.00 deg	0.00 ft	0.00 ft	0.00 ft

Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		Vsect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
26.00	0.00	0.00	26.00	0.00	0.00	0.00	0.00
153.00	0.79	338.88	153.00	0.82	-0.32	0.87	0.62
241.00	0.57	336.89	240.99	1.79	-0.71	1.91	0.25
329.00	0.64	341.82	328.98	2.65	-1.03	2.84	0.10
353.00	0.66	341.88	352.98	2.91	-1.12	3.11	0.08
430.00	0.68	346.77	429.98	3.78	-1.36	3.99	0.08
509.00	0.62	325.97	508.97	4.59	-1.70	4.87	0.31
598.00	0.64	326.94	597.97	5.41	-2.25	5.84	0.03
685.00	0.61	343.66	684.96	6.26	-2.64	6.78	0.21
728.00	0.64	346.22	727.96	6.71	-2.76	7.24	0.10
815.00	1.00	316.47	814.95	7.73	-3.40	8.44	0.63
902.00	1.88	272.75	901.92	8.35	-5.35	9.86	1.55
990.00	3.11	266.79	989.84	8.29	-9.17	11.49	1.43
1077.00	3.85	257.12	1076.68	7.50	-14.38	13.09	1.08
1165.00	5.40	255.61	1164.39	5.82	-21.27	14.62	1.77
1253.00	6.48	252.38	1251.92	3.28	-30.01	16.22	1.28
1341.00	7.10	251.66	1339.30	0.07	-39.91	17.71	0.71
1429.00	7.10	257.47	1426.63	-2.82	-50.38	19.74	0.82
1517.00	7.25	256.67	1513.94	-5.28	-61.09	22.27	0.20
1605.00	5.04	262.75	1601.43	-7.05	-70.33	24.77	2.61
1644.00	4.40	268.61	1640.29	-7.30	-73.53	25.96	2.05
1747.00	4.65	270.32	1742.97	-7.37	-81.65	29.49	0.28
1821.00	4.61	269.46	1816.73	-7.39	-87.62	32.12	0.11
1909.00	4.36	269.47	1904.46	-7.45	-94.51	35.10	0.28
1996.00	4.36	267.48	1991.21	-7.63	-101.12	37.87	0.17
2083.00	4.47	262.12	2077.95	-8.24	-107.78	40.26	0.49
2168.00	4.28	262.75	2162.70	-9.09	-114.21	42.34	0.23
2254.00	4.05	263.12	2248.48	-9.86	-120.40	44.39	0.27
2340.00	4.05	261.27	2334.26	-10.68	-126.42	46.31	0.15
2429.00	4.56	256.56	2423.01	-11.98	-132.97	48.04	0.70
2517.00	4.53	257.96	2510.73	-13.52	-139.77	49.67	0.13
2604.00	4.97	261.23	2597.44	-14.81	-146.85	51.64	0.59
2692.00	4.65	260.78	2685.13	-15.97	-154.14	53.83	0.37
2781.00	4.71	258.84	2773.83	-17.25	-161.29	55.84	0.19
2869.00	5.35	255.82	2861.49	-18.96	-168.81	57.63	0.79

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Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		VSect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
2957.00	5.05	254.73	2949.13	-20.98	-176.52	59.23	0.36
3045.00	4.89	254.46	3036.80	-23.01	-183.87	60.66	0.18
3134.00	4.69	267.70	3125.49	-24.17	-191.16	62.84	1.26
3221.00	4.42	270.00	3212.21	-24.31	-198.07	65.77	0.37
3309.00	4.65	267.86	3299.94	-24.44	-205.03	68.72	0.32
3397.00	4.49	266.31	3387.66	-24.80	-212.03	71.50	0.23
3486.00	5.20	259.36	3476.34	-25.77	-219.47	73.92	1.03
3573.00	5.27	258.07	3562.98	-27.32	-227.25	75.97	0.16
3660.00	5.49	259.58	3649.59	-28.90	-235.26	78.09	0.30
3747.00	5.74	258.31	3736.18	-30.53	-243.61	80.32	0.32
3835.00	5.67	259.43	3823.74	-32.22	-252.19	82.60	0.15
3924.00	5.95	259.45	3912.28	-33.87	-261.05	85.03	0.31
4012.00	6.11	260.01	3999.80	-35.52	-270.14	87.58	0.19
4100.00	5.78	258.92	4087.32	-37.19	-279.11	90.05	0.40
4187.00	6.37	261.07	4173.83	-38.78	-288.17	92.63	0.73
4277.00	6.35	262.92	4263.28	-40.17	-298.04	95.75	0.23
4365.00	5.60	263.74	4350.80	-41.23	-307.14	98.81	0.86
4453.00	5.41	261.56	4438.40	-42.31	-315.51	101.55	0.32
4542.00	6.29	261.89	4526.93	-43.61	-324.49	104.35	0.99
4630.00	5.38	263.54	4614.48	-44.76	-333.36	107.24	1.05
4718.00	4.51	267.52	4702.15	-45.37	-340.92	110.03	1.06
4806.00	4.98	273.10	4789.85	-45.32	-348.19	113.30	0.75
4895.00	4.44	265.04	4878.55	-45.40	-355.48	116.44	0.96
4983.00	4.24	253.34	4966.30	-46.63	-361.99	118.22	1.03
5008.00	4.42	252.51	4991.22	-47.19	-363.79	118.52	0.76
5093.00	4.89	254.10	5075.94	-49.16	-370.40	119.67	0.57
5189.00	7.70	278.44	5171.37	-49.34	-380.70	124.06	3.98
5237.00	10.40	290.66	5218.77	-47.34	-387.94	129.06	6.87
5286.00	11.80	305.04	5266.86	-42.90	-396.18	136.68	6.31
5334.00	13.39	316.59	5313.72	-36.04	-404.02	146.30	6.19
5382.00	15.55	319.22	5360.19	-27.13	-412.04	157.84	4.70
5430.00	18.27	320.01	5406.11	-16.49	-421.08	171.38	5.69
5479.00	21.39	321.63	5452.20	-3.60	-431.57	187.58	6.46
5527.00	24.16	324.43	5496.45	11.25	-442.72	205.83	6.20
5575.00	26.67	326.89	5539.81	28.27	-454.32	226.23	5.67
5623.00	30.07	328.90	5582.04	47.60	-466.42	248.91	7.36
5670.00	33.33	330.08	5622.02	68.88	-478.94	273.54	7.06
5718.00	35.91	330.22	5661.52	92.53	-492.51	300.75	5.38
5766.00	39.67	329.44	5699.44	117.95	-507.30	330.09	7.90
5814.00	43.44	328.52	5735.36	145.22	-523.71	361.81	7.96
5863.00	48.06	328.07	5769.54	175.07	-542.16	396.74	9.45
5911.00	52.71	327.72	5800.14	206.38	-561.81	433.51	9.70
5959.00	57.01	327.52	5827.76	239.52	-582.83	472.53	8.96
6007.00	62.08	326.74	5852.08	274.26	-605.28	513.61	10.65
6056.00	66.40	327.14	5873.37	311.24	-629.35	557.42	8.85
6104.00	70.84	327.38	5890.86	348.83	-653.51	601.82	9.26
6151.00	74.15	328.35	5905.00	386.78	-677.35	646.40	7.31
6199.00	76.05	329.31	5917.34	426.47	-701.36	692.61	4.40
6247.00	77.83	330.81	5928.19	466.98	-724.69	739.27	4.80
6295.00	79.65	333.17	5937.56	508.54	-746.79	786.32	6.13

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Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		Vsect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
6344.00	81.52	334.71	5945.58	551.97	-768.02	834.65	4.92
6392.00	84.07	337.11	5951.60	595.43	-787.46	882.23	7.27
6439.00	85.06	338.40	5956.05	638.74	-805.17	928.91	3.45
6536.00	85.37	338.24	5964.14	728.56	-840.88	1025.26	0.36
6632.00	88.89	340.90	5968.95	818.39	-874.33	1120.63	4.59
6728.00	91.66	341.27	5968.49	909.20	-905.45	1215.83	2.91
6824.00	91.54	340.39	5965.81	999.84	-936.96	1311.06	0.92
6921.00	91.11	338.61	5963.56	1090.67	-970.92	1407.55	1.89
7007.00	90.68	340.55	5962.22	1171.25	-1000.92	1493.09	2.31
7094.00	90.49	337.76	5961.33	1252.54	-1031.87	1579.69	3.21
7181.00	91.54	334.74	5959.79	1332.15	-1066.90	1666.58	3.67
7268.00	91.23	337.68	5957.69	1411.73	-1101.98	1753.47	3.40
7354.00	91.11	338.40	5955.93	1491.47	-1134.14	1839.21	0.85
7441.00	91.23	337.60	5954.16	1572.12	-1166.72	1925.95	0.93
7528.00	89.81	339.48	5953.37	1653.08	-1198.55	2012.64	2.71
7614.00	90.06	340.15	5953.46	1733.79	-1228.22	2098.16	0.83
7701.00	90.92	335.93	5952.72	1814.46	-1260.75	2184.90	4.95
7788.00	90.31	335.53	5951.79	1893.77	-1296.50	2271.84	0.84
7874.00	90.25	335.23	5951.36	1971.95	-1332.33	2357.80	0.36
7961.00	90.25	335.91	5950.99	2051.16	-1368.31	2444.76	0.78
8048.00	90.12	339.40	5950.70	2131.61	-1401.38	2531.54	4.01
8135.00	91.05	336.21	5949.82	2212.15	-1434.24	2618.31	3.82
8222.00	89.82	337.48	5949.16	2292.13	-1468.45	2705.18	2.03
8309.00	90.55	339.40	5948.87	2373.04	-1500.42	2791.88	2.36
8395.00	91.60	337.24	5947.26	2452.94	-1532.18	2877.59	2.79
8482.00	90.37	338.27	5945.77	2533.45	-1565.11	2964.36	1.84
8569.00	90.37	339.49	5945.20	2614.60	-1596.46	3051.01	1.40
8656.00	90.92	339.89	5944.22	2696.19	-1626.65	3137.54	0.78
8743.00	91.73	339.28	5942.21	2777.70	-1656.99	3224.07	1.17
8829.00	90.49	338.82	5940.55	2858.00	-1687.73	3309.68	1.54
8916.00	91.73	335.60	5938.86	2938.18	-1721.42	3396.50	3.97
9003.00	91.41	334.01	5936.48	3016.87	-1758.44	3483.45	1.86
9090.00	90.74	334.16	5934.84	3095.11	-1796.46	3570.43	0.79
9176.00	90.53	335.59	5933.89	3172.96	-1832.97	3656.40	1.68
9263.00	91.42	336.01	5932.41	3252.31	-1868.63	3743.34	1.13
9350.00	90.55	337.33	5930.92	3332.18	-1903.07	3830.21	1.82
9436.00	90.49	337.94	5930.13	3411.71	-1935.80	3916.01	0.71
9523.00	90.79	336.65	5929.16	3491.96	-1969.37	4002.83	1.52
9610.00	90.86	338.24	5927.91	3572.29	-2002.74	4089.64	1.83
9696.00	90.56	340.41	5926.84	3652.74	-2033.10	4175.23	2.55
9783.00	90.31	342.66	5926.18	3735.26	-2060.65	4261.42	2.60
9870.00	91.11	343.21	5925.11	3818.42	-2086.18	4347.30	1.12
9957.00	91.23	341.23	5923.33	3901.24	-2112.74	4433.33	2.28
10043.00	90.74	339.12	5921.85	3982.13	-2141.90	4518.77	2.52
10130.00	92.47	337.73	5919.41	4062.99	-2173.88	4605.44	2.55
10216.00	91.48	336.05	5916.45	4142.04	-2207.61	4691.26	2.27
10303.00	90.93	335.29	5914.62	4221.30	-2243.45	4778.19	1.08
10391.00	90.93	335.21	5913.19	4301.20	-2280.28	4866.15	0.09
10478.00	91.29	335.11	5911.51	4380.14	-2316.82	4953.11	0.49
10565.00	90.86	337.11	5909.87	4459.67	-2352.05	5040.02	2.35

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Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		Vsect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
10651.00	90.80	338.39	5908.63	4539.25	-2384.61	5125.80	1.49
10738.00	91.23	337.53	5907.09	4619.88	-2417.25	5212.55	1.11
10825.00	91.05	337.73	5905.36	4700.32	-2450.36	5299.33	0.31
10911.00	90.99	337.68	5903.83	4779.88	-2482.98	5385.11	0.09
10998.00	90.68	337.53	5902.56	4860.31	-2516.12	5471.91	0.40
11084.00	91.23	337.06	5901.12	4939.63	-2549.31	5557.73	0.84
11171.00	90.80	337.79	5899.58	5019.95	-2582.70	5644.54	0.97
11258.00	90.68	337.68	5898.46	5100.46	-2615.66	5731.32	0.19
11345.00	91.11	338.13	5897.10	5181.06	-2648.38	5818.09	0.72
11434.00	90.80	339.45	5895.62	5264.02	-2680.58	5906.73	1.52
11521.00	90.92	341.46	5894.31	5345.99	-2709.68	5993.12	2.31
11608.00	91.48	342.30	5892.49	5428.66	-2736.73	6079.23	1.16
11695.00	91.17	339.55	5890.48	5510.85	-2765.15	6165.52	3.18
11781.00	91.11	337.72	5888.77	5590.92	-2796.47	6251.19	2.13
11868.00	90.99	336.01	5887.17	5670.91	-2830.65	6338.04	1.97
11955.00	91.67	334.43	5885.15	5749.87	-2867.10	6424.99	1.98
12042.00	91.05	334.76	5883.09	5828.44	-2904.42	6511.95	0.81
12128.00	91.23	336.40	5881.38	5906.73	-2939.96	6597.89	1.92
12215.00	90.62	337.20	5879.97	5986.68	-2974.23	6684.75	1.16
12302.00	90.86	337.58	5878.85	6066.99	-3007.67	6771.57	0.52
12388.00	90.97	336.65	5877.47	6146.20	-3041.11	6857.41	1.09
12475.00	91.17	337.86	5875.85	6226.42	-3074.74	6944.23	1.41
12561.00	91.11	338.97	5874.14	6306.38	-3106.38	7029.93	1.29
Projected to Total Depth:							
12584.00	91.11	338.97	5873.69	6327.84	-3114.63	7052.83	0.00

Vertical Section is 7052.83 ft along the target direction of 333.76 deg at a measured depth of 12584.00 ft.
Horizontal Displacement is 7052.83 ft along the well bore azimuth of 333.79 deg.
The total correction is -8.54 deg relative to Grid North.

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