WR-35
Rev. 8/23/13

State of West Virginia
Department of Environmental Protection - Office of Oil and Gas
Well Operator's Report of Well Work

API 47 - 009 - 00185 County BROOKE District BUFFALO
Quad BETHANY Pad Name THURMAN SPEECE BRK PAD Field/Pool Name PANHANDLE FIELD WET
Farm name THURMAN SPEECE, JR. & GOLDIE N. STANLEY Well Number THURMAN SPEECE BRK 5H
Operator (as registered with the OOG) SWN PRODUCTION COMPANY, LLC
Address PO BOX 12359 City SPRING State TX Zip 77391-2359

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey

Top hole	Northing 4,448,887.111	Easting 534,889.359
Landing Point of Curve	Northing 4,449,273.046	Easting 535,069.137
Bottom Hole	Northing 4,452,088.862	Easting 533,917.878

Elevation (ft) 1139.5 GL Type of Well ■New □ Existing Type of Report □Interim ■Final

Permit Type □ Deviated □ Horizontal ■ Horizontal 6A □ Vertical Depth Type □ Deep ■ Shallow

Type of Operation □ Convert □ Deepen ■ Drill □ Plug Back □ Redrilling □ Rework ■ Stimulate

Well Type □ Brine Disposal □ CBM ■ Gas □ Oil □ Secondary Recovery □ Solution Mining □ Storage □ Other _____

Type of Completion ■ Single □ Multiple Fluids Produced □ Brine ■Gas □ NGL □ Oil □ Other _____
Drilled with □ Cable ■ Rotary

Drilling Media Surface hole ■ Air □ Mud ■Fresh Water Intermediate hole ■ Air □ Mud □ Fresh Water □ Brine
Production hole ■ Air ■ Mud □ Fresh Water □ Brine
Mud Type(s) and Additive(s)
SOBM

Date permit issued 2/17/2017 Date drilling commenced 7/25/2017 Date drilling ceased 10/30/2017
Date completion activities began 2/10/2018 Date completion activities ceased 4/18/2018
Verbal plugging (Y/N) N Date permission granted N/A Granted by N/A

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug

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Freshwater depth(s) ft 264 Open mine(s) (Y/N) depths N
Salt water depth(s) ft 475 Void(s) encountered (Y/N) depths N
Coal depth(s) ft 320 Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

Reviewed
6/11/18

Reviewed by:
SB 6/11/18

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API 47- 009 - 00185 Farm name THURMAN SPEECE, JR. & GOLDIE N. STANLEY Well number THURMAN SPEECE BRK 5H

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	24	20	126	NEW	J-55/94#		Y
Surface	17.5	13.375	411	NEW	J-55/54.50#	350.3', 308.2	Y, 20'
Coal	SEE SURFACE						
Intermediate 1	12.25	9.625	1717	NEW	J-55/36#		Y, 22'
Intermediate 2							
Intermediate 3							
Production	8.75/8.50	5.5	16669	NEW	HCP-110/20#		Y
Tubing		2.375	6455	NEW	L-80/4.7#		N
Packer type and depth set							

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft^3/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor	CLASS A	GROUT TO SURFACE				SURFACE	24
Surface	CLASS A	374	15.60	1.20	448.8	SURFACE	8
Coal	SEE SURFACE						
Intermediate 1	CLASS A	660	15.60	1.18	778.8	SURFACE	8
Intermediate 2							
Intermediate 3							
Production	CLASS A	3106	15.60	1.19	3696.14	SURFACE	24
Tubing							

Drillers TD (ft) 16669 Loggers TD (ft) 16669
Deepest formation penetrated MARCELLUS Plug back to (ft) N/A
Plug back procedure N/A

Kick off depth (ft) 5148

Check all wireline logs run ■ caliper ■ density ■ deviated/directional □ induction
■ neutron ■ resistivity ■ gamma ray ■ temperature □ sonic

Well cored □ Yes ■ No Conventional Sidewall Were cuttings collected □ Yes ■ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING

SURFACE: 7 CENTRALIZERS - EVERY THIRD JOINT OF CASING
INTERMEDIATE: 24 CENTRALIZERS - EVERY THIRD JOINT OF CASING
PRODUCTION: 181 CENTRALIZERS - EVERY THIRD JOINT FROM SURFACE TO TOP OF CURVE, THEN EVERY JOINT UNTIL TD

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WAS WELL COMPLETED AS SHOT HOLE □ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? □ Yes ■ No DETAILS

WERE TRACERS USED □ Yes ■ No TYPE OF TRACER(S) USED

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PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
	SEE	ATTACHMENT	1		

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
		SEE	ATTACHMENT	2				

Please insert additional pages as applicable.

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PRODUCING FORMATION(S)	DEPTHS			
MARCELLUS	5,948	TVD	6,427	MD

Please insert additional pages as applicable.

GAS TEST □ Build up □ Drawdown □ Open Flow OIL TEST □ Flow □ Pump

SHUT-IN PRESSURE Surface 1303 psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	4697 mcfpd	545 bpd	_____ bpd	636 bpd	□ Estimated □ Orifice □ Pilot

LITHOLOGY/ FORMATION NAME	TOP DEPTH IN FT TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		
	SEE	ATTACHMENT	3		

Please insert additional pages as applicable.

Drilling Contractor SWN DRILLING COMPANY
Address PO BOX 12359 City SPRING State TX Zip 77391-2359

Logging Company WEATHERFORD
Address 2000 St. James Place City Houston State TX Zip 77056

Cementing Company SCHLUMBERGER WELL SERVICES
Address 1080 US Hwy 33 East City Weston State WV Zip 26452

Stimulating Company US WELL SERVICES
Address 533 Industrial Park Dr. City Jane Lew State WV Zip 26378

Please insert additional pages as applicable.

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Completed by BOBBY WILLIS Telephone 832-796-2884
Signature _____ Title REGULATORY ANALYST Date 5/30/2018

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

Southwestern Energy

Thurman Speece BRK 5H
Brooke County, WV
SDC 41
Plan vs Actual

Plan Data for Thurman Speece BRK 5H

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

MD (USft)	Inc (°)	Az (°)	TVD (USft)	+N/-S (USft)	+E/-W (USft)	VSec (USft)	DLS (DLSU)	Toolface (°)	Comments
4976.00	5.68	51.05	4959.22	236.49	288.98	142.15	0.62	31.5	Last WFT SVY
5184.80	5.68	51.05	5166.99	249.48	305.05	149.90	0.00	0.0	Curve KOP 7° DLS
6111.52	70.00	26.10	5862.49	720.78	560.13	526.56	7.00	334.0	Build/Turn 9° DLS
6684.93	90.70	337.82	5964.00	1265.51	571.16	1044.50	9.00	287.8	Landing Point
16660.50	90.70	337.82	5842.00	10501.92	-3195.25	10977.25	0.00	0.0	PBHL TS5H

Target Set Information:
Name: Thurman Speece BRK 5H
Position offsets from Slot centre

Name	TVD (USft)	+N/-S (USft)	+E/-W (USft)	Northing (USft)	Easting (USft)	Lat (°)	Long (°)
LP TS5H	5964.00	1165.79	611.82	14597222.92	1755494.66	40.192841	-80.587921
PBHL TS5H	5842.00	10501.92	-3195.25	14606559.05	1751687.59	40.218526	-80.601403

Plan Data for Thurman Speece BRK 5H

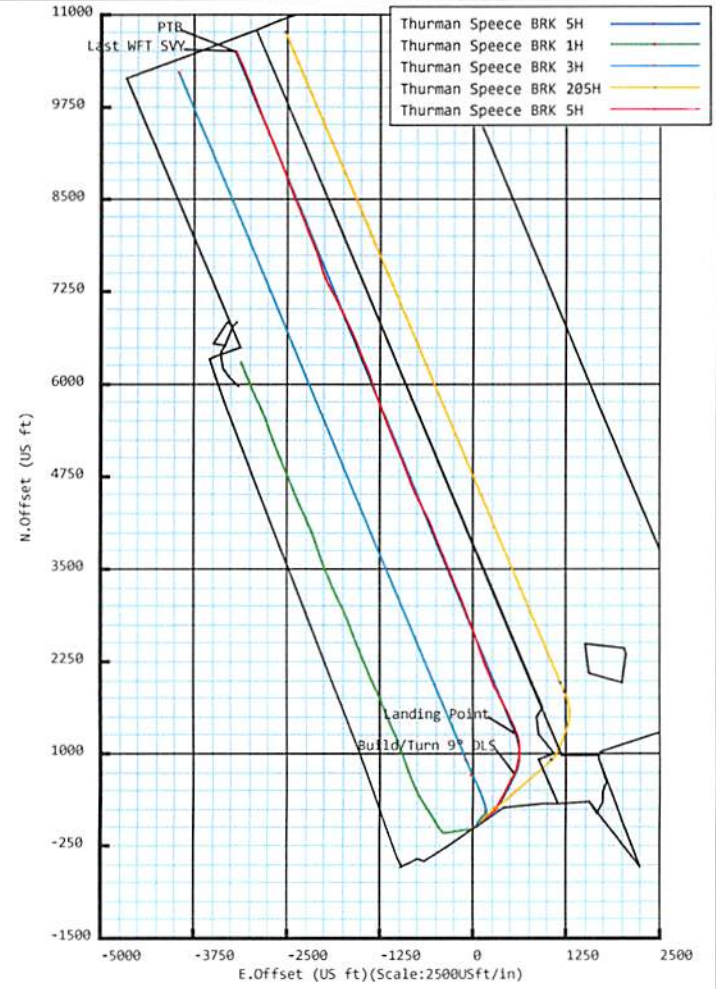
Field: SOUTHWESTERN_BROOKE CO, WV UTM NAD 83 (17N)
Map Unit: USFt Vertical Reference Datum (VRD):
Projected Coordinate System: NAD83 / UTM zone 17N

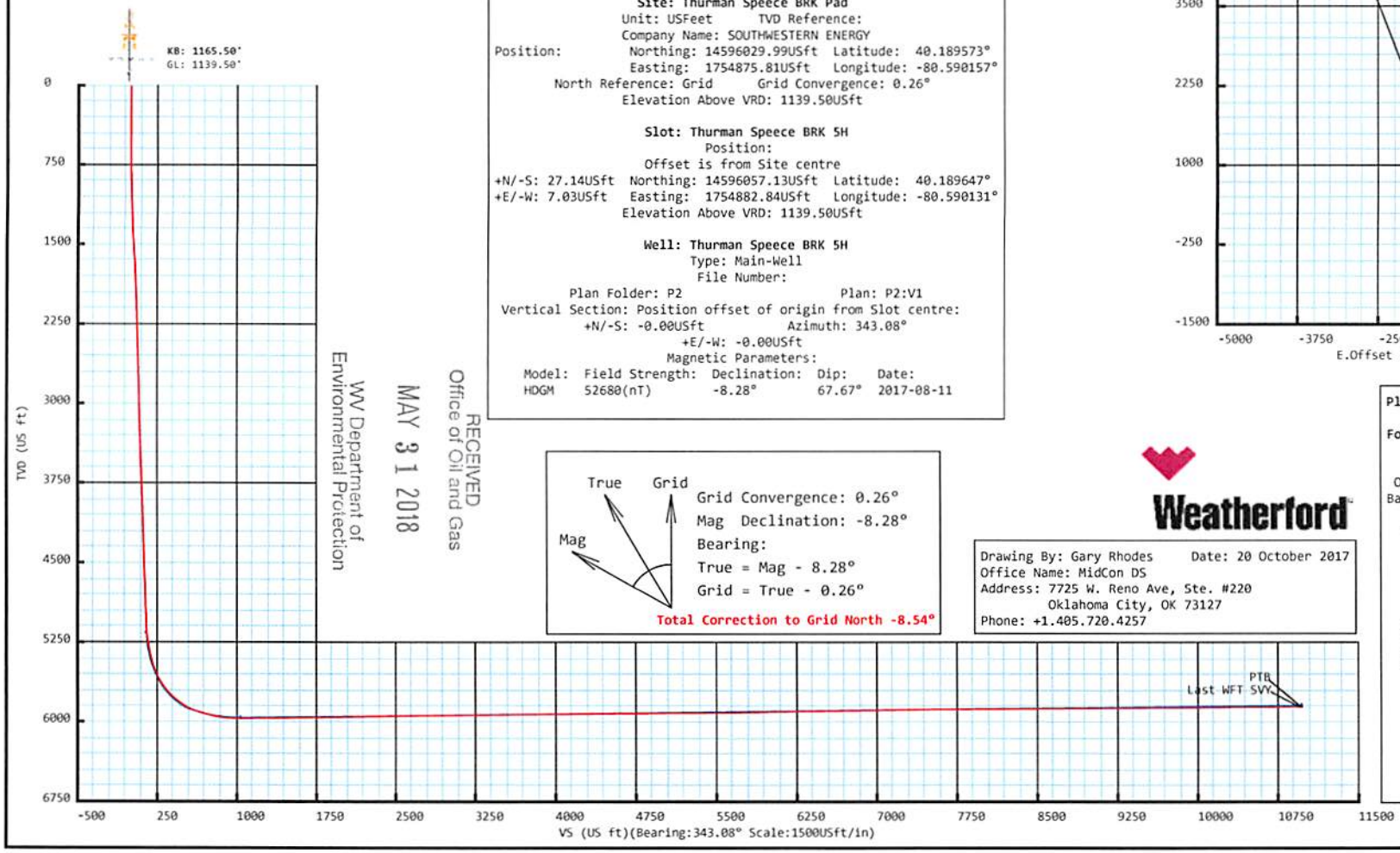
Site: Thurman Speece BRK Pad
Unit: USFeet TVD Reference:
Company Name: SOUTHWESTERN ENERGY
Position: Northing: 14596029.99USft Latitude: 40.189573°
Easting: 1754875.81USft Longitude: -80.590157°
North Reference: Grid Grid Convergence: 0.26°
Elevation Above VRD: 1139.50USft

Slot: Thurman Speece BRK 5H
Position:
Offset is from Site centre
+N/-S: 27.14USft Northing: 14596057.13USft Latitude: 40.189647°
+E/-W: 7.03USft Easting: 1754882.84USft Longitude: -80.590131°
Elevation Above VRD: 1139.50USft

Well: Thurman Speece BRK 5H
Type: Main-Well
File Number:
Plan Folder: P2 Plan: P2:V1
Vertical Section: Position offset of origin from Slot centre:
+N/-S: -0.00USft Azimuth: 343.08°
+E/-W: -0.00USft
Magnetic Parameters:

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





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Grid Convergence: 0.26°
Mag Declination: -8.28°
Bearing:
True = Mag - 8.28°
Grid = True - 0.26°
Total Correction to Grid North -8.54°

Weatherford

Drawing By: Gary Rhodes Date: 20 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 5H

Formation Point Information:

Name	TVD (USft)	SS (USft)	MD (USft)
Onondaga Limestone	-4824.00	0.00	-1.00
Base of Fresh Water	263.50	902.00	263.50
Pittsburgh Coal	342.50	823.00	342.50
Top of Salt Water	645.50	520.00	645.54
Maxton	1160.50	5.00	1161.62
Big Lime	1325.50	-160.00	1327.47
Big Injun	1518.50	-353.00	1521.35
Base Big Injun	1633.50	-468.00	1636.85
Berea	1972.50	-807.00	1977.11
Upper Rhinestreet	5418.50	-4253.00	5445.48
Lower Rhinestreet	5525.50	-4360.00	5566.40
Basal Rhinestreet	5586.50	-4421.00	5640.40
Cashaqua	5656.50	-4491.00	5732.16
Middlesex	5706.50	-4541.00	5804.11
Lower Middlesex	5730.50	-4565.00	5841.28
Burket	5768.50	-4603.00	5904.88
Tully	5784.50	-4619.00	5933.89
Mahantango	5838.50	-4673.00	6047.18
Levanna	5937.50	-4772.00	6386.67
Upper Marcellus	5947.50	-4782.00	6444.57

Southwestern Energy®

5D Survey Report

SOUTHWESTERN ENERGY

Field Name: *SOUTHWESTERN_BROOKE CO, WV UTM NAD 83 (17N)*
Site Name: *Thurman Speece BRK Pad*
Well Name: *Thurman Speece BRK 5H*
Survey: *Definitive survey*

28 October 2017

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Thurman Speece BRK 5H

Field Name: SOUTHWESTERN_BROOKE CO, WV UTM NAD 83 (17N)	**Map Units:** US ft	**Company Name:** SOUTHWESTERN ENERGY
	Vertical Reference Datum (VRD):	
	Projected Coordinate System: NAD83 / UTM zone 17N	
	Comment:	

Site: Thurman Speece BRK Pad	**Units:** US ft	**North Reference:** Grid	**Convergence Angle:** 0.26
	Position:	**Northing:** 14596029.99 US ft	**Latitude:** 40° 11' 22.46"
		Easting: 1754875.81 US ft	**Longitude:** -80° 35' 24.56"
	Elevation above Field Reference: 1139.50 US ft		
	Comment:		

Slot: Thurman Speece BRK 5H	**Position (Relative to Site Centre)**		
	+N/-S: 27.14 US ft	**Northing:** 14596057.13 US ft	**Latitude:** 40°11'22.73"
	+E/-W: 7.03 US ft	**Easting:** 1754882.84 US ft	**Longitude:** -80°35'24.47"
	Elevation above Field Reference: 1139.50 US ft		
	Comment:		

Well: Thurman Speece BRK 5H	**Type:** Main well	**UWI:**	
	File Number:	**Comment:**	
	Closure Distance: 10977.3US ft	**Closure Azimuth:** 343.12°	
	Vertical Section: Position of Origin (Relative to Slot centre)		
	+N/-S: -0.00 US ft	**+E/-W:** -0.00 US ft	**Az:** 343.08°

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Drill floor: Survey Name: Definitive Survey

Rig Height (Drill Floor): 26.00us ft	**Elevation above Field Reference:** 1165.50us ft	**Inclination:** 0.00°	**Azimuth:** 0.00°

Survey Name: Definitive Survey

Date: 10/Aug/2017	**Survey Tool:** *See Survey Tool Ranges below.*	**Comment:**	**Company:**

Magnetic Model:

Model Name: HDGM	**Date:** 11/Aug/2017	**Field Strength:** 52680.0nT	**Declination:** -8.28°	**Dip:** 67.67°

Tie Point:

MD: 0.00 US ft	**Inclination:** 0.00°	**Azimuth:** 0.00°	**TVD:** -0.00 US ft	**North Offset:** -0.00 US ft	**East Offset:** 0.00 US ft

Survey Tool Ranges:

Name	Start MD(USFt)	End MD(USFt)	Source Survey
MFAC_US_V2	0.00	353.00	WFT MWD_01-MFAC
MFAC_US_V2	353.00	512.00	WFT MWD_02-MFAC
MWD	512.00	1635.00	WFT MWD_02-MWD
MWD	1635.00	4976.00	WFT MWD_03
MWD	4976.00	5093.00	WFT MWD_04

Survey Tool Ranges:

Name	Start MD(USFt)	End MD(USFt)	Source Survey
MWD	5093.00	16669.00	WFT MWD_05

Wellpath created using minimum curvature.

Survey Points: (Relative to Slot centre)(TVD relative to Drill Floor)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
0.00	0.00	0.00	-0.00	-0.00	-0.00	0.00	14596057.13	1754882.84	0.00	
26.00	0.00	0.00	26.00	-0.00	-0.00	0.00	14596057.13	1754882.84	0.00	
152.00	0.17	216.90	152.00	-0.11	-0.15	-0.11	14596056.98	1754882.73	0.13	
240.00	0.32	210.76	240.00	-0.35	-0.47	-0.32	14596056.66	1754882.52	0.17	
328.00	0.18	248.22	328.00	-0.53	-0.73	-0.57	14596056.40	1754882.27	0.24	
353.00	0.27	170.48	353.00	-0.59	-0.80	-0.60	14596056.33	1754882.24	1.16	
423.00	0.28	131.90	423.00	-0.90	-1.08	-0.44	14596056.05	1754882.40	0.26	
512.00	0.67	98.13	511.99	-1.31	-1.30	0.23	14596055.83	1754883.07	0.52	
599.00	1.31	83.03	598.98	-1.70	-1.25	1.73	14596055.88	1754884.57	0.79	
686.00	2.02	76.44	685.94	-1.96	-0.77	4.20	14596056.36	1754887.04	0.84	
774.00	2.52	65.74	773.87	-1.80	0.39	7.47	14596057.52	1754890.31	0.74	
860.00	2.94	52.00	859.78	-0.77	2.53	10.94	14596059.66	1754893.78	0.90	
948.00	4.08	49.97	947.61	1.27	5.93	15.11	14596063.06	1754897.95	1.30	
1037.00	4.61	51.95	1036.36	3.81	10.17	20.35	14596067.30	1754903.19	0.62	
1125.00	5.17	53.57	1124.03	6.41	14.70	26.33	14596071.83	1754909.17	0.66	
1212.00	5.96	51.60	1210.62	9.37	19.84	33.02	14596076.97	1754915.86	0.93	
1299.00	5.88	45.45	1297.16	13.09	25.77	39.74	14596082.90	1754922.58	0.73	
1387.00	5.35	34.91	1384.74	17.72	32.30	45.30	14596089.43	1754928.14	1.31	
1475.00	5.53	29.56	1472.34	23.17	39.35	49.74	14596096.48	1754932.58	0.61	
1563.00	5.56	31.40	1559.93	28.93	46.68	54.05	14596103.81	1754936.89	0.20	
1635.00	4.89	27.31	1631.63	33.44	52.38	57.28	14596109.51	1754940.12	1.06	
1736.00	4.56	31.83	1732.29	39.18	59.62	61.37	14596116.75	1754944.21	0.49	
1824.00	4.72	40.70	1820.00	43.42	65.33	65.57	14596122.46	1754948.41	0.83	
1912.00	5.63	51.56	1907.65	46.94	70.76	71.32	14596127.89	1754954.16	1.51	
1998.00	5.17	52.35	1993.26	49.86	75.75	77.69	14596132.88	1754960.53	0.54	
2087.00	3.92	55.89	2081.98	52.18	79.91	83.38	14596137.04	1754966.22	1.44	
2174.00	4.60	49.19	2168.74	54.47	83.85	88.48	14596140.98	1754971.32	0.97	
2261.00	5.51	49.46	2255.40	57.56	88.85	94.30	14596145.98	1754977.14	1.05	
2349.00	5.89	54.69	2342.97	60.68	94.21	101.19	14596151.34	1754984.03	0.73	
2436.00	5.78	55.11	2429.52	63.44	99.29	108.43	14596156.42	1754991.27	0.14	
2524.00	5.61	55.46	2517.08	66.11	104.27	115.61	14596161.40	1754998.45	0.20	
2613.00	5.44	55.69	2605.67	68.68	109.11	122.68	14596166.24	1755005.52	0.19	
2701.00	5.56	55.88	2693.26	71.19	113.85	129.65	14596170.98	1755012.49	0.14	
2789.00	5.33	57.71	2780.87	73.53	118.43	136.64	14596175.56	1755019.48	0.33	
2877.00	4.48	59.03	2868.54	75.45	122.38	143.04	14596179.51	1755025.88	0.97	
2964.00	4.33	56.88	2955.29	77.19	125.92	148.70	14596183.05	1755031.54	0.26	
3050.00	4.08	49.35	3041.06	79.33	129.69	153.74	14596186.82	1755036.58	0.70	
3137.00	4.50	50.86	3127.81	81.87	133.86	158.74	14596190.99	1755041.58	0.50	
3226.00	5.08	53.39	3216.50	84.51	138.41	164.61	14596195.54	1755047.45	0.69	
3314.00	5.05	52.76	3304.16	87.17	143.08	170.82	14596200.21	1755053.66	0.07	
3402.00	5.01	49.94	3391.82	90.03	147.90	176.84	14596205.03	1755059.68	0.28	
3491.00	5.14	54.05	3480.47	92.85	152.74	183.05	14596209.87	1755065.89	0.43	
3578.00	5.01	52.64	3567.13	95.45	157.33	189.22	14596214.46	1755072.06	0.21	
3666.00	4.76	46.35	3654.81	98.44	162.18	194.92	14596219.31	1755077.76	0.67	
3754.00	4.86	51.04	3742.50	101.48	167.05	200.46	14596224.18	1755083.30	0.46	
3842.00	4.60	52.73	3830.20	104.10	171.53	206.16	14596228.66	1755089.00	0.34	
3931.00	4.64	54.19	3918.91	106.51	175.80	211.92	14596232.93	1755094.76	0.14	
4019.00	4.64	48.38	4006.62	109.15	180.24	217.47	14596237.37	1755100.31	0.5[illegible]	
4107.00	4.80	51.55	4094.33	111.99	184.90	223.01	14596242.03	1755105.85	0.35	
4195.00	4.94	51.99	4182.01	114.70	189.52	228.88	14596246.65	1755111.72	0.16	
4284.00	5.33	50.01	4270.65	117.70	194.54	235.07	14596251.67	1755117.91	0.48	
4372.00	5.74	56.24	4358.24	120.58	199.61	241.86	14596256.74	1755124.70	0.83	

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Survey Points: (Relative to Slot centre)(TVD relative to Drill Floor)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
4459.00	6.69	59.01	4444.73	123.07	204.64	249.82	14596261.77	1755132.66	1.14	
4547.00	6.87	52.18	4532.11	126.19	210.50	258.37	14596267.63	1755141.21	0.94	
4635.00	5.14	52.01	4619.63	129.49	216.16	265.64	14596273.29	1755148.48	1.97	
4724.00	5.31	50.96	4708.26	132.47	221.20	271.98	14596278.33	1755154.82	0.22	
4811.00	4.90	44.43	4794.91	135.77	226.39	277.71	14596283.52	1755160.55	0.82	
4899.00	5.27	48.54	4882.57	139.25	231.75	283.37	14596288.88	1755166.21	0.59	
4976.00	5.68	51.05	4959.22	142.15	236.49	288.98	14596293.62	1755171.82	0.62	
4998.00	5.74	52.07	4981.11	142.95	237.85	290.69	14596294.98	1755173.53	0.54	
5093.00	5.43	54.75	5075.66	146.07	243.36	298.11	14596300.49	1755180.95	0.43	
5125.00	4.70	53.02	5107.53	146.99	245.03	300.40	14596302.16	1755183.24	2.33	
5157.00	4.76	43.40	5139.42	148.10	246.78	302.36	14596303.91	1755185.20	2.48	
5189.00	6.78	26.30	5171.26	150.14	249.44	304.11	14596306.57	1755186.95	8.22	
5237.00	10.29	20.85	5218.72	155.59	255.99	306.89	14596313.12	1755189.73	7.50	
5286.00	13.04	23.56	5266.71	163.26	265.15	310.66	14596322.28	1755193.50	5.72	
5334.00	15.12	27.26	5313.26	171.87	275.68	315.69	14596332.81	1755198.53	4.72	
5382.00	17.57	28.43	5359.32	181.45	287.61	322.01	14596344.74	1755204.85	5.15	
5430.00	20.91	27.68	5404.63	192.64	301.57	329.44	14596358.70	1755212.28	6.98	
5478.00	24.73	27.48	5448.87	205.92	318.07	338.05	14596375.20	1755220.89	7.96	
5526.00	28.84	28.58	5491.71	221.21	337.16	348.23	14596394.29	1755231.07	8.62	
5574.00	32.36	29.57	5533.02	238.18	358.50	360.11	14596415.63	1755242.95	7.41	
5622.00	35.94	29.59	5572.73	256.72	381.93	373.41	14596439.06	1755256.25	7.46	
5670.00	40.02	28.42	5610.56	277.27	407.76	387.71	14596464.89	1755270.55	8.63	
5718.00	43.78	27.85	5646.28	299.92	436.03	402.82	14596493.16	1755285.66	7.87	
5766.00	46.91	27.01	5680.02	324.34	466.34	418.54	14596523.47	1755301.38	6.64	
5814.00	50.20	26.73	5711.78	350.31	498.43	434.80	14596555.56	1755317.64	6.87	
5863.00	53.78	26.48	5741.95	378.30	532.94	452.09	14596590.07	1755334.93	7.32	
5911.00	57.30	26.57	5769.11	407.03	568.35	469.76	14596625.48	1755352.60	7.33	
5959.00	59.98	27.62	5794.08	436.50	604.83	488.43	14596661.96	1755371.27	5.89	
6007.00	62.45	28.22	5817.20	466.32	642.00	508.13	14596699.13	1755390.97	5.26	
6056.00	65.46	28.74	5838.71	497.23	680.69	529.12	14596737.82	1755411.96	6.22	
6104.00	68.68	27.43	5857.41	528.49	719.69	549.92	14596776.82	1755432.76	7.16	
6151.00	69.72	22.87	5874.11	561.09	759.45	568.59	14596816.58	1755451.43	9.34	
6199.00	71.36	18.47	5890.10	596.95	801.78	584.55	14596858.91	1755467.39	9.29	
6247.00	73.00	15.12	5904.80	634.96	845.52	597.74	14596902.65	1755480.58	7.47	
6295.00	74.58	11.47	5918.20	674.78	890.37	608.33	14596947.50	1755491.17	8.01	
6343.00	76.62	7.49	5930.14	716.41	936.21	615.98	14596993.34	1755498.82	9.09	
6391.00	77.64	4.01	5940.83	759.59	982.77	620.67	14597039.90	1755503.51	7.38	
6439.00	79.33	0.77	5950.42	803.97	1029.75	622.62	14597086.88	1755505.46	7.49	
6487.00	81.77	357.30	5958.30	849.48	1077.08	621.82	14597134.21	1755504.66	8.76	
6535.00	84.13	354.55	5964.19	895.92	1124.59	618.43	14597181.72	1755501.27	7.52	
6583.00	86.54	351.03	5968.10	943.07	1172.04	612.43	14597229.17	1755495.27	8.87	
6632.00	88.64	346.92	5970.16	991.75	1220.08	603.07	14597277.21	1755485.91	9.41	
6680.00	89.94	341.03	5970.75	1039.72	1266.19	589.82	14597323.32	1755472.66	12.56	
6728.00	90.99	337.89	5970.37	1087.62	1311.13	572.98	14597368.26	1755455.82	6.90	
6824.00	90.80	335.86	5968.87	1183.04	1399.40	535.29	14597456.53	1755418.13	2.12	
6920.00	90.31	335.07	5967.94	1278.18	1486.73	495.43	14597543.86	1755378.27	0.97	
7007.00	90.55	334.72	5967.28	1364.30	1565.51	458.52	14597622.64	1755341.36	0.49	
7093.00	90.86	333.88	5966.22	1449.28	1642.99	421.22	14597700.12	1755304.06	1.04	
7180.00	90.86	333.47	5964.92	1535.10	1720.96	382.65	14597778.09	1755265.49	0.47	
7267.00	91.23	333.92	5963.33	1620.92	1798.94	344.10	14597856.07	1755226.94	0.67	
7354.00	90.92	334.04	5961.70	1706.81	1877.11	305.94	14597934.24	1755188.78	0.38	
7441.00	90.74	336.74	5960.44	1793.01	1956.19	269.72	14598013.32	1755152.56	3.11	
7526.00	90.68	338.53	5959.39	1877.62	2034.79	237.38	14598091.92	1755120.22	2.11	
7613.00	90.99	336.67	5958.12	1964.21	2115.21	204.23	14598172.34	1755087.07	2.17	
7700.00	90.99	338.51	5956.61	2050.79	2195.62	171.07	14598252.75	1755053.91	2.11	
7786.00	91.54	338.96	5954.72	2136.52	2275.75	139.89	14598332.88	1755022.73	0.83	
7873.00	91.54	340.91	5952.38	2223.36	2357.43	110.05	14598414.56	1754992.89	2.24	
7960.00	90.80	340.99	5950.60	2310.28	2439.65	81.66	14598496.78	1754964.50	0.86	
8046.00	90.74	340.77	5949.45	2396.21	2520.90	53.49	14598578.03	1754936.33	0.27	

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5D Survey Report

Survey Points: (Relative to Slot centre)(TVD relative to Drill Floor)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
8133.00	90.68	339.98	5948.37	2483.10	2602.84	24.28	14598659.97	1754907.12	0.91	
8220.00	91.05	339.58	5947.05	2569.95	2684.47	-5.79	14598741.60	1754877.05	0.63	
8306.00	90.68	340.00	5945.76	2655.80	2765.16	-35.50	14598822.29	1754847.34	0.65	
8393.00	90.80	339.05	5944.63	2742.62	2846.66	-65.92	14598903.79	1754816.92	1.10	
8480.00	90.25	338.73	5943.83	2829.38	2927.82	-97.26	14598984.95	1754785.58	0.73	
8567.00	90.80	338.50	5943.04	2916.12	3008.82	-128.98	14599065.95	1754753.86	0.69	
8654.00	90.62	338.70	5941.96	3002.84	3089.82	-160.72	14599146.95	1754722.12	0.31	
8740.00	90.80	337.68	5940.89	3088.52	3169.66	-192.67	14599226.79	1754690.17	1.20	
8827.00	90.68	336.71	5939.77	3175.06	3249.85	-226.39	14599306.98	1754656.45	1.12	
8913.00	90.31	337.71	5939.03	3260.60	3329.13	-259.70	14599386.26	1754623.14	1.24	
9000.00	90.68	338.69	5938.28	3347.28	3409.90	-292.01	14599467.03	1754590.83	1.20	
9089.00	90.62	338.05	5937.27	3435.97	3492.63	-324.81	14599549.76	1754558.03	0.72	
9178.00	90.74	338.10	5936.21	3524.63	3575.19	-358.04	14599632.32	1754524.80	0.15	
9265.00	90.74	338.33	5935.09	3611.31	3655.97	-390.32	14599713.10	1754492.52	0.26	
9352.00	90.93	338.58	5933.82	3698.01	3736.88	-422.27	14599794.01	1754460.57	0.36	
9439.00	90.74	338.49	5932.55	3784.73	3817.84	-454.10	14599874.97	1754428.74	0.24	
9526.00	90.62	338.24	5931.52	3871.43	3898.70	-486.18	14599955.83	1754396.66	0.32	
9614.00	90.71	338.59	5930.50	3959.13	3980.53	-518.55	14600037.66	1754364.29	0.41	
9701.00	90.31	338.42	5929.72	4045.85	4061.47	-550.42	14600118.60	1754332.42	0.50	
9788.00	90.55	336.15	5929.07	4132.40	4141.72	-584.02	14600198.85	1754298.82	2.62	
9875.00	90.92	333.24	5927.95	4218.45	4220.35	-621.20	14600277.48	1754261.64	3.37	
9962.00	90.49	332.84	5926.88	4304.11	4297.89	-660.64	14600355.02	1754222.20	0.68	
10048.00	90.31	333.33	5926.28	4388.81	4374.57	-699.56	14600431.70	1754183.28	0.61	
10135.00	90.93	332.97	5925.34	4474.50	4452.19	-738.86	14600509.32	1754143.98	0.82	
10222.00	90.92	335.49	5923.94	4560.44	4530.52	-776.67	14600587.65	1754106.17	2.90	
10309.00	90.25	337.13	5923.05	4646.83	4610.18	-811.62	14600667.31	1754071.22	2.04	
10396.00	90.37	339.04	5922.58	4733.49	4690.89	-844.09	14600748.02	1754038.75	2.20	
10482.00	90.74	340.39	5921.74	4819.34	4771.55	-873.91	14600828.68	1754008.93	1.63	
10569.00	90.55	339.38	5920.76	4906.20	4853.24	-903.82	14600910.37	1753979.02	1.18	
10655.00	90.71	338.41	5919.82	4991.96	4933.46	-934.79	14600990.59	1753948.05	1.14	
10744.00	90.74	337.17	5918.69	5080.57	5015.85	-968.43	14601072.98	1753914.41	1.39	
10831.00	90.00	337.03	5918.13	5167.10	5095.99	-1002.28	14601153.12	1753880.56	0.87	
10918.00	90.37	337.75	5917.85	5253.67	5176.31	-1035.73	14601233.44	1753847.11	0.93	
11004.00	90.68	337.08	5917.06	5339.24	5255.71	-1068.75	14601312.84	1753814.09	0.86	
11091.00	90.12	339.19	5916.45	5425.91	5336.44	-1101.15	14601393.57	1753781.69	2.51	
11178.00	90.43	337.29	5916.04	5512.60	5417.24	-1133.40	14601474.37	1753749.44	2.21	
11265.00	90.55	338.91	5915.29	5599.26	5497.95	-1165.85	14601555.08	1753716.99	1.87	
11351.00	90.25	339.77	5914.69	5685.08	5578.42	-1196.19	14601635.55	1753686.65	1.06	
11438.00	91.17	339.65	5913.61	5771.92	5660.01	-1226.36	14601717.14	1753656.48	1.07	
11525.00	90.86	339.50	5912.07	5858.74	5741.53	-1256.72	14601798.66	1753626.12	0.40	
11611.00	91.17	339.87	5910.55	5944.58	5822.17	-1286.57	14601879.30	1753596.27	0.56	
11698.00	91.05	340.73	5908.86	6031.46	5904.06	-1315.89	14601961.19	1753566.95	1.00	
11785.00	91.30	341.25	5907.08	6118.38	5986.30	-1344.22	14602043.43	1753538.62	0.66	
11872.00	91.23	340.31	5905.16	6205.29	6068.43	-1372.86	14602125.56	1753509.98	1.08	
11958.00	90.80	339.47	5903.64	6291.14	6149.17	-1402.42	14602206.30	1753480.42	1.10	
12045.00	90.86	336.12	5902.38	6377.75	6229.70	-1435.29	14602286.83	1753447.55	3.85	
12132.00	90.86	336.10	5901.07	6464.10	6309.24	-1470.52	14602366.37	1753412.32	0.02	
12218.00	90.80	338.69	5899.82	6549.66	6388.62	-1503.57	14602445.75	1753379.27	3.01	
12305.00	90.80	339.51	5898.61	6636.44	6469.88	-1534.60	14602527.01	1753348.24	0.94	
12392.00	90.86	338.43	5897.35	6723.21	6551.08	-1565.82	14602608.21	1753317.02	1.24	
12479.00	90.74	336.53	5896.13	6809.78	6631.43	-1599.14	14602688.56	1753283.70	2.19	
12566.00	90.92	335.80	5894.87	6896.14	6711.00	-1634.29	14602768.13	1753248.55	0.86	
12652.00	90.74	335.72	5893.63	6981.43	6789.41	-1669.59	14602846.54	1753213.25	0.23	
12739.00	91.23	335.42	5892.13	7067.67	6868.61	-1705.57	14602925.74	1753177.27	0.66	
12826.00	90.68	334.73	5890.68	7153.81	6947.50	-1742.23	14603004.63	1753140.61	1.01	
12913.00	90.86	333.27	5889.51	7239.71	7025.68	-1780.36	14603082.81	1753102.48	1.69	
13000.00	91.23	332.21	5887.93	7325.28	7103.01	-1820.20	14603160.14	1753062.64	1.29	
13087.00	90.93	333.08	5886.29	7410.82	7180.26	-1860.17	14603237.39	1753022.67	1.06	
13173.00	90.68	330.97	5885.08	7495.21	7256.20	-1900.51	14603313.33	1752982.33	2.47	

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5D Survey Report

Survey Points: (Relative to Slot centre)(TVD relative to Drill Floor)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
13260.00	90.35	331.89	5884.30	7580.42	7332.60	-1942.11	14603389.73	1752940.73	1.12	
13347.00	90.26	336.12	5883.83	7666.31	7410.78	-1980.23	14603467.91	1752902.61	4.86	
13434.00	89.82	340.54	5883.77	7752.99	7491.61	-2012.35	14603548.74	1752870.49	5.11	
13520.00	90.68	343.40	5883.40	7838.96	7573.38	-2038.97	14603630.51	1752843.87	3.47	
13607.00	90.49	343.32	5882.51	7925.95	7656.73	-2063.88	14603713.86	1752818.96	0.24	
13693.00	90.49	341.74	5881.77	8011.94	7738.76	-2089.69	14603795.89	1752793.15	1.84	
13780.00	90.37	339.21	5881.12	8098.84	7820.75	-2118.77	14603877.88	1752764.07	2.91	
13867.00	90.37	336.99	5880.56	8185.51	7901.46	-2151.22	14603958.59	1752731.62	2.55	
13953.00	90.80	337.50	5879.68	8271.06	7980.77	-2184.48	14604037.90	1752698.36	0.78	
14040.00	90.49	339.17	5878.70	8357.75	8061.61	-2216.59	14604118.74	1752666.25	1.95	
14127.00	90.19	338.47	5878.18	8444.51	8142.73	-2248.03	14604199.86	1752634.81	0.88	
14214.00	90.62	337.91	5877.57	8531.19	8223.50	-2280.35	14604280.63	1752602.49	0.81	
14300.00	90.31	338.18	5876.87	8616.85	8303.26	-2312.50	14604360.39	1752570.34	0.48	
14387.00	90.86	338.41	5875.98	8703.55	8384.09	-2344.67	14604441.22	1752538.17	0.69	
14473.00	90.56	337.83	5874.92	8789.22	8463.89	-2376.72	14604521.02	1752506.12	0.76	
14562.00	90.43	338.41	5874.15	8877.88	8546.48	-2409.89	14604603.61	1752472.95	0.67	
14649.00	90.31	339.08	5873.59	8964.63	8627.56	-2441.42	14604684.69	1752441.42	0.78	
14735.00	90.49	339.07	5872.99	9050.42	8707.88	-2472.14	14604765.01	1752410.70	0.21	
14822.00	90.55	339.31	5872.20	9137.21	8789.20	-2503.04	14604846.33	1752379.80	0.28	
14909.00	90.25	339.55	5871.59	9224.03	8870.65	-2533.61	14604927.78	1752349.23	0.44	
14995.00	90.37	339.38	5871.12	9309.86	8951.19	-2563.78	14605008.32	1752319.06	0.24	
15082.00	90.74	338.97	5870.28	9396.65	9032.50	-2594.71	14605089.63	1752288.13	0.63	
15168.00	90.56	338.38	5869.31	9482.40	9112.61	-2625.98	14605169.74	1752256.86	0.72	
15255.00	90.00	337.78	5868.88	9569.06	9193.31	-2658.46	14605250.44	1752224.38	0.94	
15342.00	90.31	337.69	5868.65	9655.68	9273.83	-2691.42	14605330.96	1752191.42	0.37	
15428.00	90.18	337.42	5868.28	9741.28	9353.31	-2724.25	14605410.44	1752158.59	0.35	
15515.00	90.19	337.46	5868.00	9827.86	9433.65	-2757.63	14605490.78	1752125.21	0.05	
15605.00	90.37	337.37	5867.56	9917.42	9516.75	-2792.20	14605573.88	1752090.64	0.22	
15692.00	90.37	338.69	5866.99	10004.08	9597.43	-2824.74	14605654.56	1752058.10	1.52	
15778.00	90.53	340.00	5866.32	10089.89	9677.90	-2855.08	14605735.03	1752027.76	1.53	
15865.00	90.49	339.69	5865.54	10176.75	9759.57	-2885.05	14605816.70	1751997.79	0.36	
15952.00	90.74	338.80	5864.61	10263.55	9840.92	-2915.88	14605898.05	1751966.96	1.06	
16039.00	90.31	338.70	5863.81	10350.30	9922.00	-2947.41	14605979.13	1751935.43	0.51	
16125.00	90.18	339.09	5863.45	10436.07	10002.23	-2978.38	14606059.36	1751904.46	0.48	
16212.00	90.49	338.71	5862.94	10522.83	10083.39	-3009.70	14606140.52	1751873.14	0.56	
16299.00	90.18	338.36	5862.43	10609.56	10164.36	-3041.53	14606221.49	1751841.31	0.54	
16385.00	90.37	337.51	5862.02	10695.21	10244.06	-3073.84	14606301.19	1751809.00	1.01	
16472.00	90.37	336.61	5861.45	10781.73	10324.17	-3107.75	14606381.30	1751775.09	1.03	
16559.00	90.18	335.83	5861.04	10868.10	10403.79	-3142.83	14606460.92	1751740.01	0.92	
16646.00	90.18	336.39	5860.76	10954.46	10483.33	-3178.06	14606540.46	1751704.78	0.64	Last WFT SVY
16669.00	90.18	336.39	5860.69	10977.30	10504.41	-3187.27	14606561.54	1751695.57	0.00	PTB

Formation Points: (Relative to Slot centre)(TVD relative to Drill Floor)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	Name	Comment
N/A	5.55	52.56	5980.50	17.04	29.44	14596074.17	1754912.28	Onondaga Limestone	
263.50	0.27	216.88	263.50	-0.57	-0.38	14596056.56	1754882.46	Base of Fresh Water	
342.50	0.19	193.64	342.50	-0.76	-0.60	14596056.37	1754882.24	Pittsburgh Coal	
474.50	0.49	105.82	474.50	-1.22	-0.14	14596055.91	1754882.70	Top of Salt Water	
1115.43	5.11	53.41	1114.50	14.19	25.64	14596071.32	1754908.48	Maxton	
1351.60	5.54	39.39	1349.50	29.62	43.27	14596086.75	1754926.11	Big Lime	
1576.63	5.43	30.70	1573.50	47.79	54.72	14596104.92	1754937.56	Big Injun	
1652.93	4.83	28.07	1649.50	53.73	57.98	14596110.86	1754940.82	Base Big Injun	
1977.15	5.28	52.15	1972.50	74.59	76.19	14596131.72	1754959.03	Berea	
5447.06	22.27	27.60	5420.50	307.14	332.35	14596364.27	1755215.19	Upper Rhinestreet	
5567.48	31.88	29.45	5527.50	355.48	358.40	14596412.61	1755241.24	Lower Rhinestreet	

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Formation Points: (Relative to Slot centre)(TVD relative to Drill Floor)									
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	Name	Comment
5641.68	37.61	29.08	5588.50	392.20	379.18	14596449.33	1755262.02	Basal Rhinestreet	
5735.08	44.89	27.54	5658.50	446.60	408.37	14596503.73	1755291.21	Cashaqua	
5808.89	49.85	26.76	5708.50	494.93	433.04	14596552.06	1755315.88	Middlesex	
5847.22	52.63	26.56	5732.50	521.63	446.44	14596578.76	1755329.28	Lower Middlesex	
5913.58	57.44	26.63	5770.50	570.29	470.73	14596627.42	1755353.57	Burket	
5922.94	57.97	26.84	5775.50	577.35	474.29	14596634.48	1755357.13	Tully	
6034.37	64.13	28.51	5829.50	663.51	519.74	14596720.64	1755402.58	Mahantango	
6335.98	76.32	8.07	5928.50	929.45	615.06	14596986.58	1755497.90	Levanna	
6380.18	77.41	4.79	5938.50	972.23	619.86	14597029.36	1755502.70	Upper Marcellus	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	2/10/2018
Job End Date:	4/5/2018
State:	West Virginia
County:	Brooke
API Number:	47-009-00185-00-00
Operator Name:	Southwestern Energy
Well Name and Number:	Thurman Speece BRK 5H
Latitude:	40.18964700
Longitude:	-80.59013100
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	5,970
Total Base Water Volume (gal):	14,491,977
Total Base Non Water Volume:	0

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Southwestern Energy	Carrier/Base Fluid					
			Water	7732-18-5	100.00000	84.63209	
Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	13.93761	
HCL Acid (12.6%-17.5%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.40000	1.10903	
			Hydrogen Chloride	7647-01-0	17.50000	0.25785	
WFRA-2000	U.S. Well Services, LLC	Friction Reducer					
			Water	7732-18-5	60.00000	0.02106	
			2-Propenoic acid, polymer with 2-propenamide	9003-06-9	30.00000	0.01053	
			Hydrated light distillate (petroleum)	64742-47-8	30.00000	0.00863	
BIOC11219A	Nalco Champion	Anti-Bacterial Agent					
			Methanol	64-17-5	60.00000	0.00896	
			Benzyl-(C12-C16 Alkyl)-Dimethyl-Ammonium Chloride	68424-85-1	30.00000	0.00569	
			Glutaraldehyde	111-30-8	10.00000	0.00190	

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SCAL16486A	Nalco Champion	Scale Inhibitor					
			Ethylene Glycol	107-21-1	30.00000	0.00165	
			Amine Triphosphate	Proprietary	30.00000	0.00147	
LT FLUSH SYSTEM I	U.S. Well Services, LLC	Other					
			Mineral oil, petroleum distillates, hrdotreated light naphthenic	64742-53-6	100.00000	0.00251	
AI-303	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Ethylene glycol	107-21-1	40.00000	0.00045	
			Cinnamaldehyde	104-55-2	20.00000	0.00016	
			Formic acid	64-18-6	20.00000	0.00016	
			Butyl cellosolve	111-76-2	20.00000	0.00014	
			Polyether	60828-78-6	10.00000	0.00008	
			Acetophenone,thiourea,formaldehyde polymer	68527-49-1	5.00000	0.00004	

Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS.

* Total Water Volume sources may include fresh water, produced water, and/or recycled water
** Information is based on the maximum potential for concentration and thus the total may be over 100%

Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided.
Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)

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THURMAN SPEECE BRK 5H
ATTACHMENT 1
PERF REPORT

STAGE NUM	Perf Date	Perf Top MD	Perf Bottom MD	# SHOTS PER STG
1	1/25/2018	16,467	16,544	33
2	2/10/2018	16,362	16,434	33
3	2/11/2018	16,257	16,329	33
4	2/12/2018	16,147	16,224	46
5	2/20/2018	16,047	16,119	33
6	2/20/2018	15,942	16,014	33
7	2/21/2018	15,837	15,909	33
8	2/21/2018	15,732	15,804	33
9	2/22/2018	15,627	15,699	33
10	2/22/2018	15,522	15,594	33
11	2/23/2018	15,417	15,489	33
12	2/23/2018	15,312	15,384	33
13	2/24/2018	15,207	15,279	33
14	2/24/2018	15,102	15,174	33
15	2/25/2018	14,997	15,069	33
16	2/25/2018	14,894	14,964	33
17	2/26/2018	14,787	14,859	33
18	2/26/2018	14,682	14,754	33
19	2/26/2018	14,577	14,649	33
20	2/26/2018	14,474	14,544	33
21	2/27/2018	14,367	14,439	33
22	2/27/2018	14,265	14,334	33
23	2/27/2018	14,157	14,229	33
24	2/27/2018	14,052	14,124	33
25	2/27/2018	13,947	14,019	33
26	2/28/2018	13,837	13,914	33
27	2/28/2018	13,737	13,809	33
28	2/28/2018	13,630	13,704	33
29	2/28/2018	13,527	13,601	33
30	2/28/2018	13,421	13,494	33
31	2/28/2018	13,317	13,391	33
32	3/1/2018	13,211	13,284	33
33	3/1/2018	13,107	13,182	33
34	3/1/2018	13,002	13,074	33
35	3/2/2018	12,897	12,972	33
36	3/2/2018	12,792	12,864	33
37	3/2/2018	12,687	12,762	33
38	3/2/2018	12,582	12,654	33
39	3/19/2018	12,477	12,544	33
40	3/20/2018	12,372	12,444	33
41	3/20/2018	12,267	12,335	33
42	3/21/2018	12,162	12,234	33
43	3/21/2018	12,057	12,125	33

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THURMAN SPEECE BRK 5H
ATTACHMENT 1
PERF REPORT

STAGE NUM	Perf Date	Perf Top MD	Perf Bottom MD	# SHOTS PER STG
44	3/21/2018	11,952	12,024	33
45	3/21/2018	11,847	11,917	33
46	3/22/2018	11,742	11,814	33
47	3/22/2018	11,637	11,709	33
48	3/22/2018	11,532	11,602	33
49	3/22/2018	11,427	11,499	33
50	3/24/2018	11,322	11,392	33
51	3/24/2018	11,217	11,289	33
52	3/26/2018	11,112	11,184	33
53	3/26/2018	11,007	11,079	33
54	3/26/2018	10,902	10,974	33
55	3/27/2018	10,797	10,869	33
56	3/27/2018	10,692	10,764	33
57	3/27/2018	10,587	10,659	33
58	3/27/2018	10,482	10,554	33
59	3/28/2018	10,377	10,449	33
60	3/28/2018	10,272	10,344	33
61	3/29/2018	10,167	10,239	33
62	3/29/2018	10,062	10,134	33
63	3/29/2018	9,957	10,029	33
64	3/29/2018	9,852	9,924	33
65	3/29/2018	9,747	9,819	33

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THURMAN SPEECE BRK 5H
ATTACHMENT 2
STIM REPORT

STAGE NUM	Stim Date	Ave Pump Rate (BPM)	Ave Treatment	Max Breakdown	ISIP (PSI)	Amount of Proppant (lbs)	Amount of water bbls	Amount of nitrogen/othe
1	2/10/2018	80	8,275	8,909	3,677	210,000	4,119	
2	2/11/2018	48	8,600	9,168	4,130	11,500	5,578	
3	2/11/2018	84	8,042	8,434	3,936	319,050	5,434	
4	2/20/2018	89	7,666	8,133	4,588	208,960	5,129	
5	2/20/2018	83	8,098	9,019	4,604	211,330	4,215	
6	2/20/2018	87	7,999	8,991	4,434	212,380	4,092	
7	2/21/2018	84	8,160	9,048	4,510	211,500	4,181	
8	2/22/2018	82	8,250	9,063	4,313	209,160	4,240	
9	2/22/2018	81	8,026	8,689	4,717	206,850	4,157	
10	2/22/2018	80	7,931	8,403	4,511	211,600	4,172	
11	2/23/2018	83	8,098	8,482	4,736	210,300	4,115	
12	2/24/2018	82	8,143	8,606	4,635	210,890	4,137	
13	2/24/2018	86	8,060	8,396	4,400	210,700	4,117	
14	2/25/2018	87	8,044	8,915	4,417	210,040	4,158	
15	2/25/2018	80	7,970	8,580	4,472	209,700	4,063	
16	2/25/2018	78	8,146	8,914	4,340	210,380	3,926	
17	2/26/2018	77	8,422	8,880	4,263	212,020	4,136	
18	2/26/2018	84	7,903	8,710	4,526	210,600	4,126	
19	2/26/2018	8,604	7,850	8,226	4,535	217,965	4,078	
20	2/27/2018	85	7,650	8,184	4,301	210,400	4,139	
21	2/27/2018	86	7,786	8,114	4,451	210,150	4,124	
22	2/27/2018	86	7,890	8,390	4,579	210,120	4,013	
23	2/27/2018	87	7,763	8,089	4,527	211,990	4,017	
24	2/27/2018	83	7,635	8,259	4,386	210,525	4,104	
25	2/27/2018	83	7,908	8,820	4,360	209,800	4,195	
26	2/28/2018	74	8,154	8,984	4,312	209,750	4,055	
27	2/28/2018	85	7,957	8,574	4,484	211,140	4,054	
28	2/28/2018	82	8,025	8,555	4,436	211,250	3,941	
29	2/28/2018	85	7,853	8,261	4,508	211,290	3,998	
30	2/28/2018	76	8,155	8,987	4,207	210,280	3,970	
31	3/1/2018	75	6,951	7,838	4,301	210,300	4,035	
32	3/1/2018	86	7,707	8,275	4,303	209,660	3,976	
33	3/1/2018	73	7,933	8,883	4,326	210,050	3,947	
34	3/1/2018	67	8,171	9,165	4,103	210,225	4,053	
35	3/2/2018	85	7,548	8,003	4,446	210,320	3,961	
36	3/2/2018	82	8,220	8,652	4,273	209,680	3,916	
37	3/2/2018	86	8,006	8,449	4,525	210,250	3,865	
38	3/19/2018	86	7,660	8,749	4,453	212,620	4,253	
39	3/20/2018	84	7,926	9,041	4,421	211,320	4,177	
40	3/20/2018	87	7,633	8,892	4,525	209,800	3,919	
41	3/20/2018	85	7,545	8,368	4,552	210,430	4,189	
42	3/21/2018	89	7,476	8,884	4,455	209,725	4,122	
43	3/21/2018	77	8,234	8,963	4,393	210,400	3,934	
44	3/21/2018	84	7,889	8,787	4,566	210,220	3,863	
45	3/22/2018	87	7,406	8,395	4,402	208,960	3,914	
46	3/22/2018	82	7,750	8,855	4,472	120,100	3,758	
47	3/22/2018	82	7,086	7,755	4,465	209,875	3,739	
48	3/22/2018	83	7,064	7,617	4,362	210,425	3,748	
49	3/22/2018	85	7,151	7,633	4,506	209,950	3,823	
50	3/24/2018	87	7,425	8,468	4,778	210,770	3,579	
51	3/26/2018	87	7,353	7,886	4,516	209,030	3,476	
52	3/26/2018	87	7,572	8,257	4,492	210,200	3,449	
53	3/26/2018	85	7,560	8,751	4,532	210,175	3,378	

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THURMAN SPEECE BRK 5H
ATTACHMENT 2
STIM REPORT

STAGE NUM	Stim Date	Ave Pump Rate (BPM)	Ave Treatment	Max Breakdown	ISIP (PSI)	Amount of Proppant (lbs)	Amount of water bbls	Amount of nitrogen/othe
54	3/27/2018	87	7,307	7,775	4,452	208,600	3,469	
55	3/27/2018	87	7,543	8,538	4,499	210,275	3,400	
56	3/27/2018	85	7,064	7,567	4,461	210,475	3,355	
57	3/27/2018	87	7,189	7,863	4,376	210,425	3,350	
58	3/27/2018	88	7,415	8,224	4,559	210,060	3,335	
59	3/28/2018	86	7,105	7,584	4,716	211,760	3,320	
60	3/29/2018	86	7,239	7,590	4,613	208,640	3,328	
61	3/29/2018	86	7,487	8,682	4,313	210,325	3,212	
62	3/29/2018	84	7,425	8,984	4,485	21,000	3,459	
63	3/29/2018	84	6,937	7,480	4,512	210,125	3,258	
64	3/29/2018	88	7,501	8,671	4,598	206,400	3,434	
65	3/30/2018	87	7,020	7,591	4,467	210,500	3,275	

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swn
Southwestern Energy®

Well Name: **Thurman Speece BRK 5H** **47009001850000**

LITHOLOGY/FORMATION	TOP DEPTH, MD (FT)	TOP DEPTH, TVD (FT)	BOTTOM DEPTH, MD (FT)	BOTTOM DEPTH, TVD (FT)	QUANTITY AND TYPE OF FLUID
Base of Fresh Water	0.00	0.00	264.00	264.00	
Top of Salt Water	475.00	475.00	NA	NA	
Pittsburgh Coal	320.00	320.00	401.00	401.00	
Pottsville (ss)	463.00	463.00	559.00	559.00	
Mauch Chunk (shale)	629.00	629.00	1220.00	1220.00	
Raven Cliff (ss)	838.00	838.00	1012.00	1012.00	
Maxton (ss)	1120.00	1120.00	1220.00	1220.00	
Greenbriar (ls)	1286.00	1286.00	1560.00	1557.00	
Big Injun (ss)	1560.00	1557.00	1636.00	1633.00	
Berea (siltstone)	NA	NA	NA	NA	
Rhinestreet (shale)	NA	NA	NA	NA	
Cashaqua (shale)	NA	NA	NA	NA	
Middlesex (shale)	5837.00	5726.00	5910.00	5769.00	
Burket (shale)	5910.00	5769.00	5934.00	5781.00	
Tully (ls)	5934.00	5781.00	6049.00	5836.00	
Mahantango (shale)	6049.00	5836.00	6427.00	5948.00	
Marcellus (shale)	6427.00	5948.00	NA	NA	Gas

THRASHER

THE THRASHER GROUP, INC.
600 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE 304-624-4108

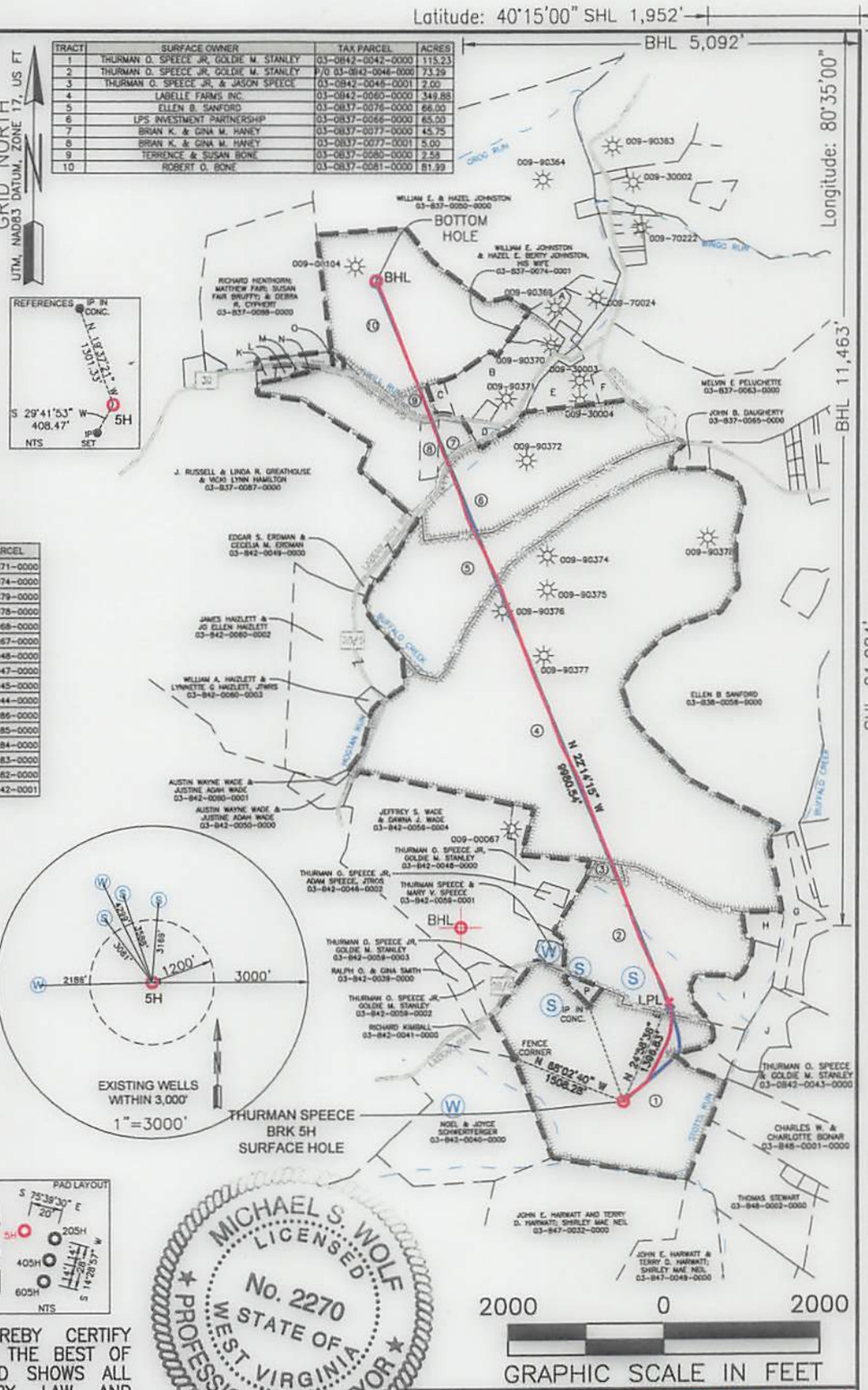
GRID NORTH
UTM, NAD83 DATUM, ZONE 17, US FT

NOTES ON SURVEY

1. COORDINATES SYSTEM IS UTM, NAD 83 DATUM, ZONE 17, U.S. FOOT AND WELL COORDINATES ESTABLISHED USING SURVEY GRADE GPS.
2. SURFACE AND ROYALTY OWNER INFORMATION AND THEIR BOUNDARIES SHOWN HEREON WERE PLOTTED FROM DEEDS AND/OR TAX PARCEL MAPS PROVIDED BY CLIENT AND FIELD LOCATIONS.
3. THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARCELS SHOWN HEREON.
4. NO DWELLINGS AND BUILDINGS WITHIN 625 FEET OF PROPOSED OF CENTER OF PAD.
5. NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF PROPOSED WELL.
6. NO PERENNIAL STREAMS, LAKES, PONDS, RESERVOIRS OR WETLANDS WITHIN 100 FEET OF THE LIMITS OF DISTURBANCE.
7. NO NATURALLY PRODUCING TROUT STREAM WITHIN 300 FEET OF LIMITS OF DISTURBANCE.

TRACT	SURFACE OWNER	TAX PARCEL	ACRES
1	THURMAN O. SPEECE JR, GOLDIE M. STANLEY	03-0842-0042-0000	115.23
2	THURMAN O. SPEECE JR, GOLDIE M. STANLEY	P/O 03-0842-0046-0000	73.29
3	THURMAN O. SPEECE JR, & JASON SPEECE	03-0842-0046-0001	2.00
4	LABELLE FARMS INC.	03-0842-0060-0000	349.88
5	ELLEN B. SANFORD	03-0837-0076-0000	66.00
6	LPS INVESTMENT PARTNERSHIP	03-0837-0066-0000	65.00
7	BRIAN K. & GINA M. HANEY	03-0837-0077-0000	45.75
8	BRIAN K. & GINA M. HANEY	03-0837-0077-0001	5.00
9	TERRENCE & SUSAN BONE	03-0837-0080-0000	2.58
10	ROBERT O. BONE	03-0837-0081-0000	81.99

ID	ADJOINER	TAX PARCEL
A	WILLIAM E. JOHNSTON & HAZEL E. JOHNSTON	03-837-0071-0000
B	BENJAMIN M. MOSA & CHRISTINE L. HEISE	03-837-0074-0000
C	BENJAMIN M. MOSA & CHRISTINE L. HEISE	03-837-0079-0000
D	WILLIAM A SPERRINGER III & JONNA L SPERRINGER	03-837-0078-0000
E	THEODORE W. BUNNELL	03-837-0068-0000
F	LOTHIE KEITH	03-837-0067-0000
G	WINDSOR POWER HOUSE COAL CO.	03-842-0048-0000
H	THURMAN O. SPEECE JR & GOLDIE M. STANLEY	03-842-0047-0000
I	THURMAN O. SPEECE JR & GOLDIE M. STANLEY	03-842-0045-0000
J	THURMAN O. SPEECE JR & GOLDIE M. STANLEY	03-842-0044-0000
K	SANDRA & CARL CLARK	03-837-0086-0000
L	MICHAEL ARACICH, WIDOWER	03-837-0085-0000
M	KAREN TOBIN, WIDOW	03-837-0084-0000
N	EDWARD EUGENE RINDERER	03-837-0083-0000
O	VERMURI HOME & GARDEN, LLC	03-837-0082-0000
P	RICHARD A. STANLEY JR	03-842-0042-0001



SURFACE HOLE LOCATION (SHL):	
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,448,887.111 EASTING: 534,889.359	
LANDING POINT LOCATION (LPL):	
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,449,242.445 EASTING: 535,075.843	
BOTTOM HOLE LOCATION (BHL):	
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,452,088.103 EASTING: 533,915.445	
SURFACE HOLE LOCATION (SHL):	
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,448,887.111 EASTING: 534,889.359	
LANDING POINT LOCATION (LPL):	
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,449,273.046 EASTING: 535,069.137	
BOTTOM HOLE LOCATION (BHL):	
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,452,088.862 EASTING: 533,917.878	

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

P.S. 2270 5/3/18

MICHAEL S. WOLF LICENSED No. 2270 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

COMPANY: SWN Production Company, LLC — SWN Production Company™

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25034

MINIMUM DEGREE OF ACCURACY: 1/200

PROVEN SOURCE OF ELEVATION: SURVEY GRADE GPS (NAVD 88, US FT)

OPERATOR'S WELL #: THURMAN SPEECE BRK 5H

API WELL #: 47 (STATE) 009 (COUNTY) 00185 (PERMIT)

WELL TYPE: OIL ☐ WASTE DISPOSAL ☐ PRODUCTION ☒ DEEP ☐ GAS ☒ LIQUID INJECTION ☐ STORAGE ☐ SHALLOW ☒

WATERSHED: BUFFALO CREEK — ELEVATION: 1139.5'

DISTRICT: BUFFALO — COUNTY: BROOKE — QUADRANGLE: BETHANY

SURFACE OWNER: THURMAN O. SPEECE JR & GOLDIE M. STANLEY — ACREAGE: 115.23

OIL & GAS ROYALTY OWNER: THURMAN O. SPEECE JR & GOLDIE M. STANLEY — ACREAGE: 115.23

DRILL ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☐ PLUG OFF OLD FORMATION ☐ PERFORATE NEW FORMATION ☐

CONVERT ☐ PLUG & ABANDON ☐ CLEAN OUT & REPLUG ☐ OTHER CHANGE ☒ (SPECIFY) AS-DRILLED

TARGET FORMATION: MARCELLUS — ESTIMATED DEPTH: 5,971' TVD 16,669' TMD

WELL OPERATOR: SWN PRODUCTION COMPANY, LLC — DESIGNATED AGENT: DEE SOUTHALL

ADDRESS: P.O. BOX 1300 — ADDRESS: P.O. BOX 1300

CITY: JANE LEW STATE: WV ZIP CODE: 26378 — CITY: JANE LEW STATE: WV ZIP CODE: 26378

LEGEND:
- PROPOSED SURFACE HOLE / BOTTOM HOLE
- EXISTING / PRODUCING WELLHEAD
- LPL LANDING POINT LOCATION
- EXISTING WATER WELL
- EXISTING SPRING
- SURVEYED BOUNDARY
- DRILLING UNIT
- LEASE BOUNDARY
- PROPOSED PATH
- AS-DRILLED PATH

REVISIONS:

DATE: 05-03-2017
DRAWN BY: K. POTH
SCALE: 1" = 2000'
DRAWING NO: 030-2888
WELL LOCATION PLAT

R:\030-2888-THURMAN SPEECE WELL PAD-SOUTHWESTERN-\SURVEY\PLATS\AS-DRILLED\THURMAN SPEECE BRK 5H AS-DRILLED.DWG
THURSDAY MAY 03 2018 10:57AM

PROPERTY NUMBER 2501164521
PAD ID 3001164503

THRASHER

THE THRASHER GROUP, INC.
600 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE 304-624-4108

Latitude: 40°15'00" SURFACE HOLE 1952'

BOTTOM HOLE 4406'

SURFACE HOLE 21,983'

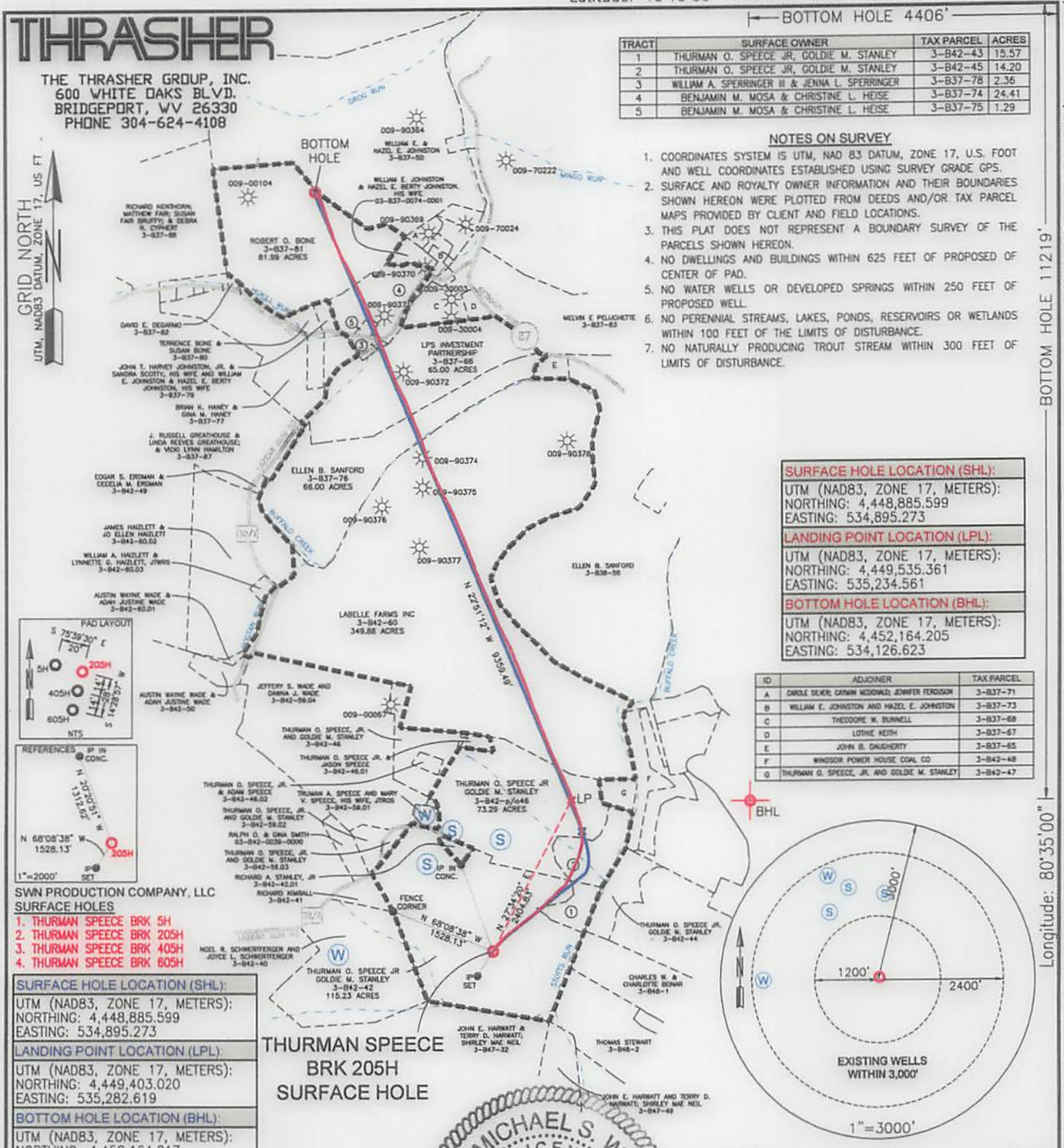
BOTTOM HOLE 11219'

Longitude: 80°35'00"

TRACT	SURFACE OWNER	TAX PARCEL	ACRES
1	THURMAN O. SPEECE JR, GOLDIE M. STANLEY	3-B42-43	15.57
2	THURMAN O. SPEECE JR, GOLDIE M. STANLEY	3-B42-45	14.20
3	WILLIAM A. SPERRINGER III & JENNA L. SPERRINGER	3-B37-78	2.36
4	BENJAMIN M. MOSA & CHRISTINE L. HEISE	3-B37-74	24.41
5	BENJAMIN M. MOSA & CHRISTINE L. HEISE	3-B37-75	1.29

NOTES ON SURVEY

1. COORDINATES SYSTEM IS UTM, NAD 83 DATUM, ZONE 17, U.S. FOOT AND WELL COORDINATES ESTABLISHED USING SURVEY GRADE GPS.
2. SURFACE AND ROYALTY OWNER INFORMATION AND THEIR BOUNDARIES SHOWN HEREON WERE PLOTTED FROM DEEDS AND/OR TAX PARCEL MAPS PROVIDED BY CLIENT AND FIELD LOCATIONS.
3. THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARCELS SHOWN HEREON.
4. NO DWELLINGS AND BUILDINGS WITHIN 625 FEET OF PROPOSED OF CENTER OF PAD.
5. NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF PROPOSED WELL.
6. NO PERENNIAL STREAMS, LAKES, PONDS, RESERVOIRS OR WETLANDS WITHIN 100 FEET OF THE LIMITS OF DISTURBANCE.
7. NO NATURALLY PRODUCING TROUT STREAM WITHIN 300 FEET OF LIMITS OF DISTURBANCE.



SURFACE HOLE LOCATION (SHL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,448,885.599 EASTING: 534,895.273
LANDING POINT LOCATION (LPL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,449,535.361 EASTING: 535,234.561
BOTTOM HOLE LOCATION (BHL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,452,164.205 EASTING: 534,126.623

ID	ADJOINER	TAX PARCEL
A	CAROLE SILVER; CATWIN MCDONALD; JENNIFER FERGUSON	3-B37-71
B	WILLIAM E. JOHNSTON AND HAZEL E. JOHNSTON	3-B37-73
C	THEODORE W. BUNNELL	3-B37-68
D	LOTHIE KEITH	3-B37-67
E	JOHN B. DAUGHERTY	3-B37-65
F	WINDSOR POWER HOUSE COAL CO	3-B42-48
G	THURMAN O. SPEECE, JR. AND GOLDIE M. STANLEY	3-B42-47

SWN PRODUCTION COMPANY, LLC
SURFACE HOLES
1. THURMAN SPEECE BRK 5H
2. THURMAN SPEECE BRK 205H
3. THURMAN SPEECE BRK 405H
4. THURMAN SPEECE BRK 605H

SURFACE HOLE LOCATION (SHL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,448,885.599 EASTING: 534,895.273
LANDING POINT LOCATION (LPL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,449,403.020 EASTING: 535,282.619
BOTTOM HOLE LOCATION (BHL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,452,164.217 EASTING: 534,121.088

THURMAN SPEECE
BRK 205H
SURFACE HOLE

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

P.S. 2270 MS.W 5/3/18

MICHAEL S. WOLF LICENSED No. 2270 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

COMPANY: SWN Production Company, LLC — SWN Production Company™

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

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OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25034

MINIMUM DEGREE OF ACCURACY: 1/200

PROVEN SOURCE OF ELEVATION: SURVEY GRADE GPS (NAVD 88, US FT)

OPERATOR'S WELL #: THURMAN SPEECE BRK 205H

API WELL #: 47 (STATE) 009 (COUNTY) 00186 (PERMIT)

WELL TYPE: OIL ☐ WASTE DISPOSAL ☐ PRODUCTION ☒ DEEP ☐ GAS ☒ LIQUID INJECTION ☐ STORAGE ☐ SHALLOW ☒

WATERSHED: BUFFALO CREEK — ELEVATION: 1139.5'

DISTRICT: BUFFALO — COUNTY: BROOKE — QUADRANGLE: BETHANY

SURFACE OWNER: THURMAN O. SPEECE JR & GOLDIE M. STANLEY — ACREAGE: 119.33

OIL & GAS ROYALTY OWNER: THURMAN O. SPEECE JR & GOLDIE M. STANLEY — ACREAGE: 119.33

DRILL ☒ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☒ PLUG OFF OLD FORMATION ☐ PERFORATE NEW FORMATION ☐

CONVERT ☐ PLUG & ABANDON ☐ CLEAN OUT & REPLUG ☐ OTHER CHANGE ☒ (SPECIFY) AS-DRILLED

TARGET FORMATION: MARCELLUS — ESTIMATED DEPTH: 5,860' TVD 16,460' TMD

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ADDRESS: P.O. BOX 1300 — ADDRESS: P.O. BOX 1300
CITY: JANE LEW STATE: WV ZIP CODE: 26378 — CITY: JANE LEW STATE: WV ZIP CODE: 26378

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- SURVEYED BOUNDARY
- DRILLING UNIT
- LEASE BOUNDARY
- PROPOSED PATH
- AS-DRILLED PATH

REVISIONS:

DATE: 05-03-2018
DRAWN BY: K. POTH
SCALE: 1" = 2000'
DRAWING NO: 030-2888
WELL LOCATION PLAT

R:\030-2888-THURMAN SPEECE WELL PAD-SOUTHWESTERN-\SURVEY\PLATS\AS-DRILLED\THURMAN SPEECE BRK 205H AS-DRILLED.DWG
THURSDAY MAY 03 2018 03:25PM

PROPERTY NUMBER 2501164518
PAD ID 3001164503