

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

API 47-009-00206 County BROOKE District BUFFALO
Quad BETHANY Pad Name MARK OWEN BRK PAD Field/Pool Name PANHANDLE
Farm name OWEN, MARK Well Number MARK OWEN BRK 6H
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 4,452,325.589 Easting 538,681.637
Landing Point of Curve Northing 4,451,993.115 Easting 538,531.044
Bottom Hole Northing 4,450,636.835 Easting 539,128.023

Elevation (ft) 1,165.6' 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 09/01/2017 Date drilling commenced 11/25/2017 Date drilling ceased 01/30/2018
Date completion activities began 04/11/2018 Date completion activities ceased 05/07/2018
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 300' Open mine(s) (Y/N) depths N JUL 12 2018
Salt water depth(s) ft 856' Void(s) encountered (Y/N) depths N WV Department of
Coal depth(s) ft 332' Cavern(s) encountered (Y/N) depths N Environmental Protection
Is coal being mined in area (Y/N) N

Reviewed
C.R.P.

Reviewed by:
GB 8/30/18

API 47- 009 - 00206 Farm name OWEN, MARK Well number MARK OWEN BRK 6H

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#		Y, 20 bbls
Coal	SEE SURFACE						
Intermediate 1	12.25	9.625	1,722'	NEW	J-55/36#		Y, 39 bbls
Intermediate 2							
Intermediate 3							
Production	8.75/8.50	5.5	11,452'	NEW	HCP-110/20#		Y
Tubing		2.375	6,421	NEW	P-110/4.7#		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	15.60	1.20		SURFACE	24
Surface	CLASS A	405	15.60	1.20	486	SURFACE	8
Coal	SEE SURFACE						
Intermediate 1	CLASS A	656	15.60	1.19	780.64	SURFACE	8
Intermediate 2							
Intermediate 3							
Production	CLASS A	2,074	15.60	1.19	2,468.06	SURFACE	24
Tubing							

Drillers TD (ft) 11,452' Loggers TD (ft) 11,452'
 Deepest formation penetrated MARCELLUS Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 5,324

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 _____

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WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS _____

WERE TRACERS USED Yes No TYPE OF TRACER(S) USED _____

API 47- 009 - 00206 Farm name OWEN, MARK Well number MARK OWEN BRK 6H

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				

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Please insert additional pages as applicable.

API 47- 009 - 00206 Farm name OWEN, MARK Well number MARK OWEN BRK 6H

PRODUCING FORMATION(S)	DEPTHS	
MARCELLUS	6,031'	TVD 6,426' MD

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 1591 psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW Gas 3785 mcfpd Oil 512 bpd NGL _____ bpd Water 141 bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP	BOTTOM	TOP	BOTTOM	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	DEPTH IN FT NAME TVD	DEPTH IN FT TVD	DEPTH IN FT MD	DEPTH IN FT MD	
	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 121 HILLPOINTE DRIVE STE 300 City CANONSBURG State PA Zip 15317

Cementing Company SCHLUMBERGER WELL SERVICES
Address 110 SCHLUMBERGER DRIVE City SUGAR LAND State TX Zip 77478

Stimulating Company US WELL SERVICES
Address 533 INDUSTRIAL PARK DRIVE City JANE LEW State WV Zip 26378

Please insert additional pages as applicable.

Completed by Elizabeth Gee Telephone 832-796-7632
Signature  Title Staff Regulatory Analyst Date 07/11/2018

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

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**MARK OWEN BRK 6H
ATTACHMENT 1
PERF REPORT**

STAGE NUM	Perf Date	Perf Top MD	Perf Bottom MD	# SHOTS PER STG
1	4/2/2018	11,343	11,236	42
2	4/11/2018	11,203	11,096	42
3	4/12/2018	11,063	10,954	42
4	4/12/2018	10,923	10,816	42
5	4/12/2018	10,783	10,676	42
6	4/12/2018	10,643	10,536	42
7	4/13/2018	10,503	10,396	42
8	4/13/2018	10,363	10,256	42
9	4/13/2018	10,223	10,116	42
10	4/13/2018	10,083	9,976	42
11	4/14/2018	9,943	9,836	42
12	4/14/2018	9,803	9,696	42
13	4/14/2018	9,663	9,556	42
14	4/14/2018	9,523	9,416	42
15	4/15/2018	9,383	9,276	42
16	4/15/2018	9,243	9,136	42
17	4/15/2018	9,103	8,996	42
18	4/15/2018	8,963	8,856	42
19	4/16/2018	8,823	8,716	42
20	4/16/2018	8,683	8,576	42
21	4/16/2018	8,543	8,436	42
22	4/16/2018	8,403	8,296	42
23	4/17/2018	8,258	8,156	42
24	4/17/2018	8,123	8,016	42
25	4/17/2018	7,983	7,876	42
26	4/17/2018	7,843	7,736	42
27	4/18/2018	7,703	7,596	42
28	4/18/2018	7,563	7,456	42
29	4/18/2018	7,423	7,316	42
30	4/18/2018	7,283	7,176	42
31	4/18/2018	7,143	7,036	42
32	4/19/2018	7,003	6,896	42
33	4/19/2018	6,863	6,756	42
34	4/19/2018	6,723	6,616	42
35	4/19/2018	6,583	6,511	33

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MARK OWEN BRK 6H

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	4/11/2018	90.3	7,458	5,233	4,255	248,550	5,609	0
2	4/12/2018	90.5	7,148	5,277	5,048	245,850	4,742	0
3	4/12/2018	91.2	6,970	5,409	4,525	245,660	5,085	0
4	4/12/2018	91.2	7,023	5,599	4,657	240,750	4,730	0
5	4/12/2018	89.1	7,019	5,766	4,901	245,850	4,689	0
6	4/13/2018	89	6,821	5,773	4,875	245,780	4,461	0
7	4/13/2018	90.4	6,769	5,016	5,310	246,300	4,453	0
8	4/13/2018	89.8	6,687	5,595	4,819	245,690	4,501	0
9	4/13/2018	90.1	6,873	5,647	4,961	246,620	4,425	0
10	4/14/2018	89.9	6,915	5,401	5,040	246,075	4,379	0
11	4/14/2018	90.1	6,781	5,480	5,007	245,580	4,390	0
12	4/14/2018	90.5	6,510	6,488	5,054	245,620	4,354	0
13	4/14/2018	89.7	6,705	5,685	4,774	245,775	4,331	0
14	4/15/2018	89.5	6,552	5,702	4,975	245,825	4,326	0
15	4/15/2018	90	6,642	5,483	4,929	245,275	4,380	0
16	4/15/2018	90	6,535	6,048	4,806	247,760	4,268	0
17	4/15/2018	89.6	6,402	6,125	5,067	245,925	4,294	0
18	4/16/2018	89.8	6,705	5,892	5,007	245,900	4,271	0
19	4/16/2018	90.6	6,621	5,671	5,129	245,460	4,199	0
20	4/16/2018	90.1	6,547	5,150	4,846	246,020	4,318	0
21	4/16/2018	89.9	6,629	5,747	5,281	246,100	4,254	0
22	4/17/2018	90.3	6,541	5,355	4,952	245,650	4,251	0
23	4/17/2018	90.1	6,440	5,957	4,835	246,800	4,214	0
24	4/17/2018	91.1	6,391	5,811	4,800	244,540	4,188	0
25	4/17/2018	90.9	6,541	5,410	4,939	245,040	4,148	0
26	4/18/2018	90.4	6,506	5,815	4,810	246,170	4,136	0
27	4/18/2018	89.8	6,472	5,646	5,134	245,700	4,089	0
28	4/18/2018	91	6,327	5,201	4,954	247,260	3,911	0
29	4/18/2018	90.7	6,239	6,351	4,699	247,780	4,193	0
30	4/18/2018	89.6	6,281	5,000	5,033	245,680	4,057	0
31	4/19/2018	90.4	6,274	5,608	5,165	246,540	4,037	0
32	4/19/2018	88.7	6,242	5,183	4,928	243,760	4,084	0
33	4/19/2018	87	6,141	5,938	4,584	229,940	4,079	0
34	4/19/2018	90.4	6,139	5,307	5,037	259,700	4,211	0
35	4/20/2018	89.8	6,554	5,741	4,201	263,195	4,198	0

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Well Name: Mark Owen BRK 6H

47009002060000

ATTACHMENT 3

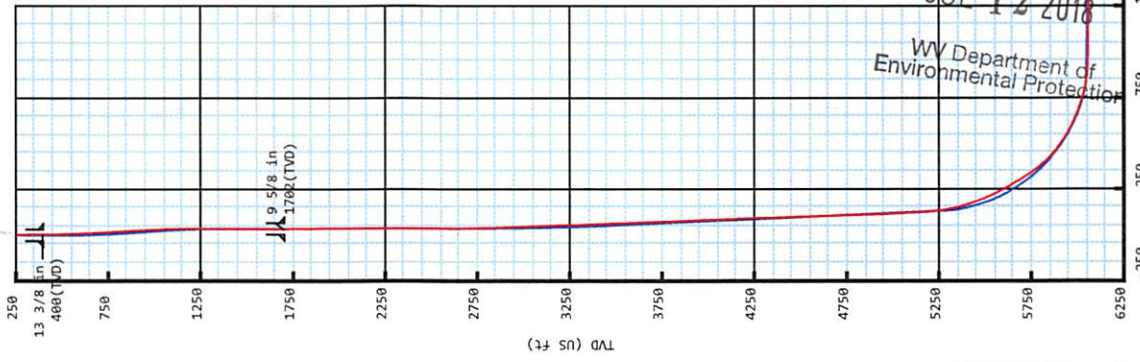
LITHOLOGY/FORMATION	TOP DEPTH, MD (FT)	TOP DEPTH, TVD (FT)	BOTTOM DEPTH, MD (FT)	BOTTOM DEPTH, TVD (FT)	QUANTITY AND TYPE OF FLUID
Base of Fresh Water	0.00	0.00	300.00	300.00	
Top of Salt Water	856.00	856.00	NA	NA	
Pittsburgh Coal	332.00	332.00	387.00	387.00	
Pottsville (ss)	548.00	548.00	687.00	687.00	
Mauch Chunk (shale)	687.00	687.00	850.00	850.00	
Raven Cliff (ss)	850.00	850.00	1063.00	1063.00	
Maxton (ss)	1205.00	1205.00	1265.00	1265.00	
Greenbriar (ls)	1348.00	1348.00	1502.00	1502.00	
Big Injun (ss)	1502.00	1502.00	1650.00	1650.00	
Berea (siltstone)	2010.00	2010.00	5449.00	5449.00	
Rhinestreet (shale)	5449.00	5449.00	5704.00	5704.00	
Cashaqua (shale)	5704.00	5704.00	5955.00	5761.00	
Middlesex (shale)	5924.00	5770.00	6012.00	5836.00	
Burket (shale)	6012.00	5836.00	6032.00	5850.00	
Tully (ls)	6032.00	5850.00	6118.00	5905.00	
Mahantango (shale)	6118.00	5905.00	6426.00	6031.00	
Marcellus (shale)	6426.00	6031.00	NA	NA	GAS

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Southwestern Energy®
Mark Owen BRK 6H
 Brooke Co, WV
 SDC 40
Plan vs Actual

KB: 1192.2'
 GL: 1166.2'



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Plan Data for Mark Owen BRK 6H

Dogleg Severity Unit: °/100.00ft		Plan Point Information:		Position offsets from Slot centre		DLS Toolface Comments	
MD	Inc	Az	TVD	+N/-S	+E/-W	Vsec	DLS
(USft)	(°)	(°)	(USft)	(USft)	(USft)	(USft)	(°)
0.00	0.00	0.00	0.00	-0.00	-0.00	0.00	0.0
26.00	0.00	0.00	26.00	-0.00	-0.00	0.00	0.0
500.00	0.00	0.00	500.00	-0.00	-0.00	0.00	0.0
950.00	4.50	160.00	949.54	-16.60	6.04	17.59	1.00
1400.00	0.00	0.00	1399.08	-33.19	12.08	35.17	1.00
2679.71	0.00	0.00	2678.79	-33.19	12.08	35.17	0.00
3529.71	17.00	246.92	3516.37	-82.26	-103.08	53.37	2.00
5365.79	17.00	246.92	5272.22	-292.68	-596.94	131.39	7.00
6358.39	70.00	161.81	6009.19	-864.48	-583.15	687.93	7.00
6579.25	89.15	156.35	6049.00	-1066.24	-505.70	992.75	9.00
11475.44	89.15	156.35	6122.00	-5550.82	1457.94	5739.10	0.00

Target Set Information:		Name: Mark Owen BRK 6H	
Name	TVD	+N/-S	+E/-W
(USft)	(USft)	(USft)	(USft)
LP M06H	6949.00	-907.04	-575.43
PBHL M06H	6122.00	-5550.82	1457.94

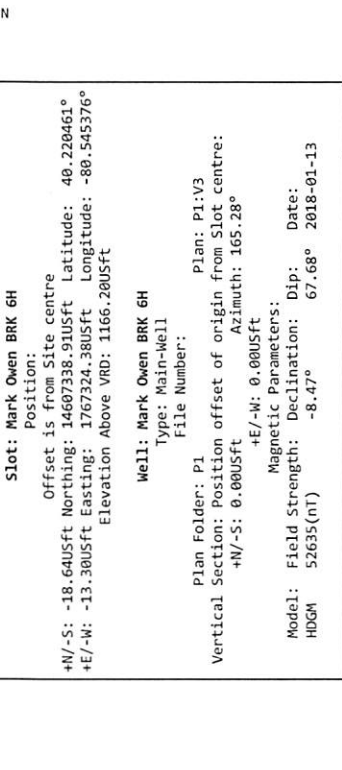
Plan Data for Mark Owen BRK 6H

Field: SOUTHWESTERN_BROOKE CO, WV UTM NAD 83 (17N)
Map Unit: USFT
 Projected Coordinate System: MAD83 / UTM zone 17N

Unit: USFEET
Site: Mark Owen Pad
Company Name: SOUTHWESTERN ENERGY
Position: Northing: 14607357.56USft Longitude: 40.220512°
 Easting: 1767337.69USft Longitude: -80.545328°
 North Reference: Grid Grid Convergence: 0.29°
 Elevation Above VRD: 1166.20USft

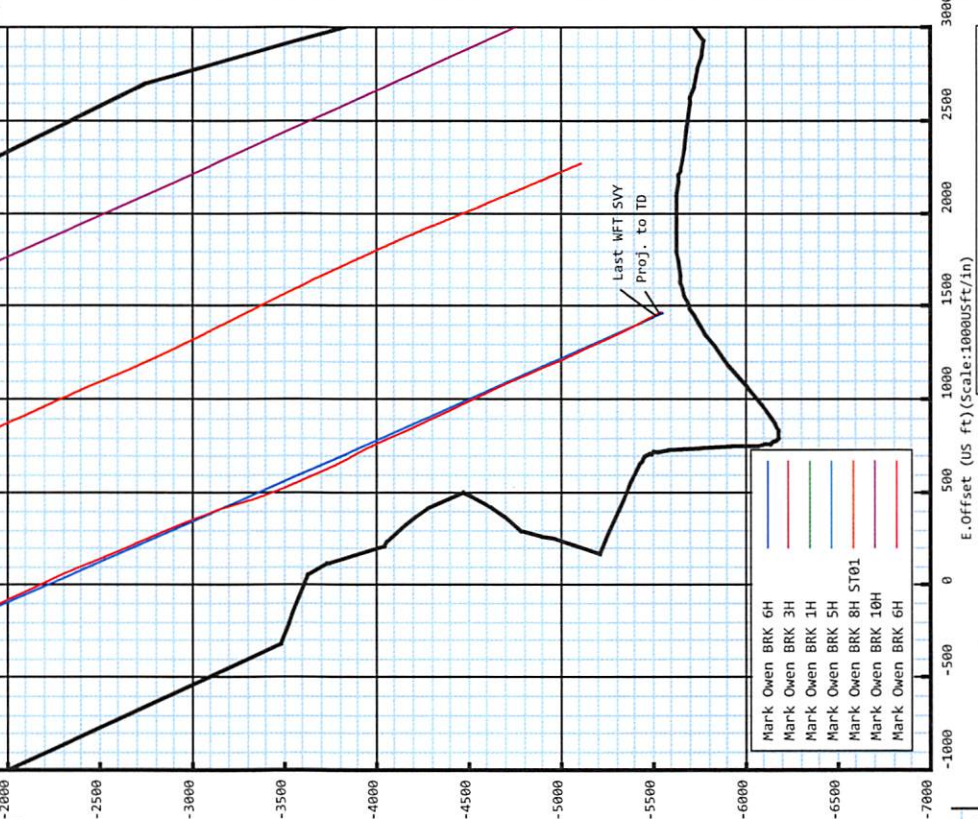
Slot: Mark Owen BRK 6H
Position: Offset is from Site centre
 +N/-S: -18.64USft Northing: 14607338.91USft Latitude: 40.220461°
 +E/-W: -13.30USft Easting: 1767324.38USft Longitude: -80.545376°
 Elevation Above VRD: 1166.20USft

Well: Mark Owen BRK 6H
Type: Main-Well
File Number: Plan: P1:V3
 Plan Folder: P1
 Vertical Section: Position offset of origin from Slot centre:
 +N/-S: 0.00USft Azimuth: 165.28°
 +E/-W: 0.00USft
Magnetic Parameters: Dip: Date:
 HDGM 52635(NI) -8.47° 67.68° 2018-01-13



Formation Point Information:

Name	TVD	SS	MD
(USft)	(USft)	(USft)	(USft)
Base of Fresh Water	240.00	952.20	240.00
Pittsburgh Coal	332.00	860.20	332.00
Top of Salt Water	856.00	336.20	856.23
Maxton	1217.00	-24.80	1217.89
Big Lime	1366.00	-173.80	1366.92
Big Injun	1507.00	-314.80	1507.92
Base Big Berea	2014.00	-464.80	1657.92
Upper Rhinestreet	5454.00	-821.80	2014.92
Lower Rhinestreet	5569.00	-4261.80	5557.45
Basal Rhinestreet	5635.00	-4376.80	5683.59
Cashaqua	5710.00	-4442.80	5759.44
Middlesex	5766.00	-4517.80	5850.31
Lower Middlesex	5793.00	-4573.80	5922.73
Burket	5827.00	-4600.80	5959.50
Tully	5845.00	-4634.80	6007.98
Mahantango	5899.00	-4652.80	6034.81
Levanna	6007.00	-4706.80	6121.68
Upper Marcellus	6026.00	-4814.80	6352.05
		-4833.80	6414.01



Drawing By: Gary Rhodes Date: 13 January 2018
 Office Name: Midcon DS
 Address: 7725 N. Reno Ave, Ste. #228
 Oklahoma City, OK 73127
 Phone: +1.405.726.4257





Weatherford®

SURVEY REPORT

Report Date: 1/28/2018
 Customer: SWN Production Co., LLC Field: Panhandle
 Job Name: NE-12927107 Rig: SDC 40
 Well Name: Mark Owen BRK 6H Rig Loc: Brooke County, WV

Survey Calculation Method: Minimum Curvature						
Magnetic Reference	Target Direction	Total Magnetic Field	Magnetic Dip Angle	Magnetic Declination	Grid Convergence	Total Correction
Grid North	165.28 deg	52635 nT	67.68 deg	-8.47 deg	0.29 deg	-8.76 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			Dogleg (deg/100ft)
				NS (ft)	EW (ft)	Vsect (ft)	
50.00	0.89	113.77	50.00	-0.16	0.36	0.24	1.78
100.00	0.96	112.50	99.99	-0.47	1.10	0.74	0.15
150.00	0.83	100.63	149.99	-0.70	1.84	1.15	0.45
200.00	1.13	116.65	199.98	-0.99	2.64	1.63	0.81
250.00	1.03	109.20	249.97	-1.36	3.50	2.20	0.34
263.00	0.54	122.64	262.97	-1.43	3.66	2.31	4.00
357.00	0.55	143.23	356.96	-2.03	4.31	3.06	0.21
473.00	1.05	164.09	472.95	-3.50	4.93	4.64	0.49
503.00	1.31	168.92	502.95	-4.10	5.07	5.25	0.93
593.00	2.43	162.18	592.90	-6.92	5.85	8.18	1.27
685.00	2.75	161.32	684.80	-10.87	7.16	12.33	0.35
777.00	3.52	158.97	776.66	-15.60	8.88	17.34	0.85
870.00	3.57	157.86	869.49	-20.95	10.99	23.05	0.09
963.00	2.96	165.33	962.34	-25.95	12.69	28.32	0.80
1055.00	2.44	187.43	1054.24	-30.19	13.04	32.51	1.25
1148.00	0.75	221.22	1147.20	-32.61	12.39	34.69	2.00
1241.00	0.48	302.39	1240.19	-32.86	11.66	34.74	0.89
1334.00	0.37	321.78	1333.19	-32.42	11.14	34.18	0.19
1426.00	0.53	271.80	1425.19	-32.17	10.53	33.79	0.44
1519.00	0.30	332.75	1518.19	-31.94	9.99	33.43	0.50
1612.00	0.10	92.76	1611.19	-31.73	9.96	33.22	0.39
1657.00	0.36	186.11	1656.19	-31.87	9.98	33.36	0.84
1797.00	0.37	171.15	1796.18	-32.75	10.01	34.22	0.07
1886.00	0.38	200.69	1885.18	-33.31	9.95	34.75	0.22
1982.00	0.30	234.31	1981.18	-33.76	9.63	35.10	0.22
2075.00	0.32	238.16	2074.18	-34.04	9.21	35.26	0.03
2168.00	0.37	255.49	2167.18	-34.25	8.70	35.34	0.12
2261.00	0.53	255.72	2260.17	-34.43	7.99	35.33	0.17
2353.00	0.25	288.71	2352.17	-34.47	7.39	35.22	0.38
2446.00	0.49	295.51	2445.17	-34.23	6.84	34.85	0.26
2539.00	0.51	298.78	2538.17	-33.86	6.12	34.31	0.04
2631.00	0.91	255.03	2630.16	-33.86	5.05	34.03	0.70
2725.00	2.21	227.47	2724.12	-35.27	3.00	34.88	1.81
2817.00	3.86	229.68	2815.99	-38.48	-0.67	37.04	1.80
2910.00	5.46	236.39	2908.68	-42.95	-6.74	39.83	1.81

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Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		VSect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
3003.00	7.48	238.01	3001.08	-48.61	-15.56	43.06	2.18
3096.00	8.88	240.11	3093.14	-55.39	-26.92	46.73	1.54
3188.00	9.81	244.56	3183.91	-62.30	-40.16	50.05	1.28
3281.00	10.79	247.79	3275.42	-68.99	-55.37	52.66	1.22
3374.00	12.50	244.74	3366.50	-76.58	-72.53	55.63	1.95
3466.00	14.27	244.18	3456.00	-85.77	-91.75	59.64	1.93
3559.00	15.68	247.05	3545.84	-95.66	-113.64	63.64	1.71
3652.00	15.57	249.67	3635.40	-104.90	-136.91	66.66	0.77
3744.00	14.70	247.85	3724.21	-113.59	-159.30	69.38	1.08
3837.00	16.88	248.70	3813.70	-122.94	-182.82	72.45	2.36
3930.00	17.46	247.30	3902.55	-133.23	-208.27	75.94	0.77
4023.00	15.20	245.44	3991.79	-143.68	-232.23	79.96	2.49
4115.00	14.31	243.46	4080.76	-153.78	-253.37	84.35	1.11
4208.00	15.63	245.12	4170.60	-164.18	-275.02	88.91	1.49
4301.00	16.64	249.84	4259.94	-174.04	-298.89	92.39	1.78
4393.00	16.75	251.10	4348.06	-182.88	-323.80	94.60	0.41
4486.00	17.11	250.27	4437.03	-191.84	-349.35	96.77	0.47
4579.00	18.06	247.80	4525.69	-201.90	-375.58	99.84	1.30
4672.00	17.75	247.94	4614.18	-212.67	-402.06	103.53	0.34
4764.00	17.45	249.54	4701.88	-222.76	-427.98	106.70	0.62
4857.00	18.02	250.39	4790.46	-232.47	-454.60	109.32	0.67
4950.00	17.97	250.27	4878.91	-242.14	-481.65	111.80	0.07
5043.00	18.08	247.53	4967.34	-252.50	-508.49	115.00	0.92
5135.00	17.47	245.70	5054.95	-263.63	-534.27	119.23	0.90
5228.00	16.87	243.28	5143.81	-275.45	-559.05	124.35	1.00
5321.00	18.50	240.50	5232.41	-288.78	-583.95	130.92	1.97
5367.00	18.42	230.53	5276.06	-297.00	-595.91	135.83	6.86
5414.00	19.22	221.15	5320.55	-307.54	-606.74	143.28	6.65
5461.00	20.34	211.33	5364.79	-320.35	-616.08	153.29	7.45
5506.00	22.15	204.16	5406.74	-334.78	-623.62	165.33	7.03
5553.00	24.34	198.94	5449.93	-352.02	-630.39	180.29	6.39
5599.00	25.90	194.97	5491.58	-370.70	-636.06	196.91	4.99
5646.00	27.39	190.54	5533.59	-391.25	-640.69	215.61	5.28
5692.00	28.79	186.47	5574.17	-412.66	-643.88	235.51	5.16
5738.00	29.75	182.23	5614.30	-435.07	-645.57	256.76	4.97
5778.00	31.01	179.87	5648.81	-455.29	-645.93	276.22	4.34
5847.00	33.59	176.90	5707.13	-492.14	-644.86	312.13	4.39
5890.00	35.17	175.12	5742.62	-516.35	-643.16	335.98	4.35
5936.00	38.42	173.43	5779.45	-543.76	-640.40	363.19	7.40
5983.00	42.34	172.08	5815.25	-573.96	-636.55	393.38	8.55
6029.00	45.74	170.18	5848.32	-605.54	-631.60	425.18	7.93
6075.00	50.58	168.69	5878.99	-639.22	-625.30	459.35	10.79
6122.00	54.91	167.55	5907.44	-675.81	-617.59	496.71	9.41
6168.00	58.44	166.42	5932.71	-713.25	-608.93	535.12	7.94
6215.00	61.53	166.14	5956.21	-752.79	-599.28	575.80	6.59
6261.00	65.79	166.14	5976.62	-792.80	-589.40	617.01	9.26
6307.00	68.67	166.21	5994.42	-833.98	-579.27	659.42	6.26
6354.00	71.46	164.70	6010.44	-876.74	-568.17	703.60	6.66
6400.00	73.35	162.72	6024.35	-918.82	-555.87	747.42	6.81
6446.00	76.14	160.91	6036.45	-960.98	-542.02	791.72	7.15

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Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		Vsect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
6493.00	79.71	159.85	6046.28	-1004.26	-526.58	837.50	7.91
6539.00	84.20	159.35	6052.72	-1046.94	-510.71	882.81	9.82
6586.00	88.71	159.09	6055.63	-1090.79	-494.07	929.45	9.61
6678.00	89.32	158.59	6057.21	-1176.57	-460.87	1020.85	0.86
6771.00	89.44	155.76	6058.21	-1262.28	-424.80	1112.91	3.05
6864.00	88.77	154.52	6059.67	-1346.65	-385.71	1204.44	1.52
6957.00	89.02	155.48	6061.46	-1430.92	-346.41	1295.93	1.07
7049.00	89.57	154.91	6062.59	-1514.42	-307.82	1386.50	0.86
7142.00	89.63	155.72	6063.24	-1598.92	-268.98	1478.10	0.87
7235.00	88.95	155.64	6064.39	-1683.66	-230.68	1569.79	0.74
7328.00	89.01	156.80	6066.05	-1768.75	-193.19	1661.61	1.25
7420.00	89.01	154.21	6067.64	-1852.45	-155.05	1752.25	2.81
7513.00	89.38	153.65	6068.95	-1935.98	-114.18	1843.42	0.72
7603.00	89.44	155.43	6069.87	-2017.23	-75.50	1931.84	1.98
7696.00	89.14	155.10	6071.03	-2101.69	-36.59	2023.42	0.48
7788.00	89.38	153.67	6072.21	-2184.64	3.18	2113.75	1.58
7881.00	89.57	155.28	6073.07	-2268.56	43.25	2205.09	1.74
7974.00	89.57	158.65	6073.76	-2354.13	79.64	2297.10	3.62
8067.00	89.14	157.73	6074.81	-2440.46	114.18	2389.38	1.09
8156.00	89.51	156.76	6075.86	-2522.53	148.61	2477.50	1.17
8246.00	89.38	156.16	6076.73	-2605.04	184.55	2566.43	0.68
8339.00	89.26	157.27	6077.83	-2690.45	221.31	2658.38	1.20
8431.00	89.51	156.09	6078.82	-2774.93	257.73	2749.34	1.31
8524.00	89.20	157.81	6079.87	-2860.50	294.14	2841.35	1.88
8614.00	89.01	157.08	6081.28	-2943.60	328.65	2930.50	0.84
8707.00	89.32	159.22	6082.63	-3029.91	363.26	3022.77	2.32
8799.00	89.51	160.10	6083.57	-3116.17	395.24	3114.32	0.98
8892.00	88.89	163.15	6084.87	-3204.41	424.55	3207.11	3.35
8985.00	88.83	163.88	6086.72	-3293.56	450.93	3300.05	0.79
9078.00	89.32	160.46	6088.22	-3382.07	479.40	3392.88	3.71
9170.00	89.07	158.96	6089.51	-3468.35	511.30	3484.44	1.65
9263.00	88.77	155.88	6091.27	-3554.20	547.00	3576.54	3.33
9356.00	88.89	155.82	6093.17	-3639.04	585.04	3668.26	0.14
9448.00	89.01	156.10	6094.85	-3723.05	622.51	3759.03	0.33
9541.00	88.52	152.81	6096.86	-3806.92	662.60	3850.34	3.58
9634.00	90.00	151.48	6098.06	-3889.14	706.05	3940.90	2.14
9727.00	89.32	155.53	6098.61	-3972.35	747.52	4031.92	4.42
9820.00	88.65	156.56	6100.26	-4057.33	785.28	4123.70	1.32
9912.00	88.83	155.92	6102.28	-4141.51	822.34	4214.53	0.72
10005.00	88.89	155.20	6104.13	-4226.16	860.81	4306.18	0.78
10098.00	88.64	155.14	6106.13	-4310.54	899.85	4397.71	0.28
10191.00	88.77	155.31	6108.24	-4394.96	938.81	4489.26	0.23
10284.00	88.58	154.54	6110.39	-4479.17	978.22	4580.72	0.85
10376.00	88.65	155.52	6112.61	-4562.55	1017.04	4671.22	1.07
10469.00	89.26	154.73	6114.31	-4646.90	1056.15	4762.75	1.07
10562.00	89.45	156.61	6115.35	-4731.63	1094.46	4854.44	2.03
10652.00	88.64	156.93	6116.85	-4814.32	1129.96	4943.43	0.97
10742.00	89.14	157.49	6118.60	-4897.28	1164.81	5032.52	0.83
10835.00	89.14	157.54	6119.99	-4983.20	1200.38	5124.66	0.55
10927.00	89.08	154.18	6121.42	-5067.14	1237.99	5215.40	0.55

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Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		VSect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
11017.00	88.89	155.22	6123.02	-5148.49	1276.45	5303.85	1.17
11107.00	89.32	156.74	6124.42	-5230.68	1313.08	5392.65	1.75
11196.00	88.95	154.51	6125.77	-5311.73	1349.80	5480.38	2.54
11286.00	88.83	153.75	6127.51	-5392.70	1389.06	5568.66	0.85
11379.00	89.08	151.75	6129.21	-5475.36	1431.63	5659.43	2.17
11429.00	89.14	153.99	6129.98	-5519.85	1454.43	5708.25	4.48
Projected to Total Depth:							
11452.00	89.14	153.99	6130.33	-5540.52	1464.52	5730.80	0.00

* MS Gyro surveys from 50.00 ft MD to 357.00 ft MD *

* Weatherford surveys from 473.00 ft MD to 11429.00 ft MD *

* TD at 11452 ft MD *

* The total correction is -8.76 deg relative to Grid North *

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WV Department of
Environmental Protection

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	4/11/2018
Job End Date:	4/20/2018
State:	West Virginia
County:	Brooke
API Number:	47-009-00206-00-00
Operator Name:	Southwestern Energy
Well Name and Number:	Mark Owen BRK 6H
Latitude:	40.22045900
Longitude:	-80.54537500
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,089
Total Base Water Volume (gal):	6,320,374
Total Base Non Water Volume:	0



Frac Focus
Chemical Disclosure Registry



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	85.05328	
Sand	J.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	13.90576	
HCL Acid (12.6%-17.5%)	J.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.40000	0.77548	
			Hydrogen Chloride	7647-01-0	17.50000	0.18030	
WFRA-2000	J.S. Well Services, LLC	Friction Reducer					
			Water	7732-18-5	60.00000	0.03217	
			2-Propenoic acid, polymer with propenamide	29003-06-9	30.00000	0.01608	
			Hydrated light distillate (petroleum)	84742-47-8	30.00000	0.01319	
BIOC11219A	Nalco Champion	Anti-Bacterial Agent					
			Methanol	64-17-5	60.00000	0.00980	
			Benzyl-(C12-C16 Alkyl)-Dimethyl-Ammonium Chloride	88424-85-1	30.00000	0.00623	
			Glutaraldehyde	111-30-8	10.00000	0.00208	

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SCAL 16486A	Nalco Champion	Scale Inhibitor					
			Ethylene Glycol	107-21-1		30.00000	0.00178
			Amine Triphosphate	Proprietary		30.00000	0.00159
LT FLUSH SYSTEM I	J.S. Well Services, LLC	Other					
			Mineral oil, petroleum distillates, hydro treated light naphthenic	64742-53-6		100.00000	0.00139
AI-303	J.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Ethylene glycol	107-21-1		40.00000	0.00039
			Cinnamaldehyde	104-55-2		20.00000	0.00014
			Formic acid	64-18-6		20.00000	0.00014
			Butyl cellosolve	111-76-2		20.00000	0.00012
			Polyether	60828-78-6		10.00000	0.00007
			Acetophenone, thiourea, formaldehyde polymer	68527-49-1		5.00000	0.00003
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%

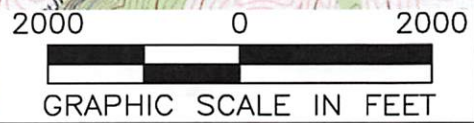
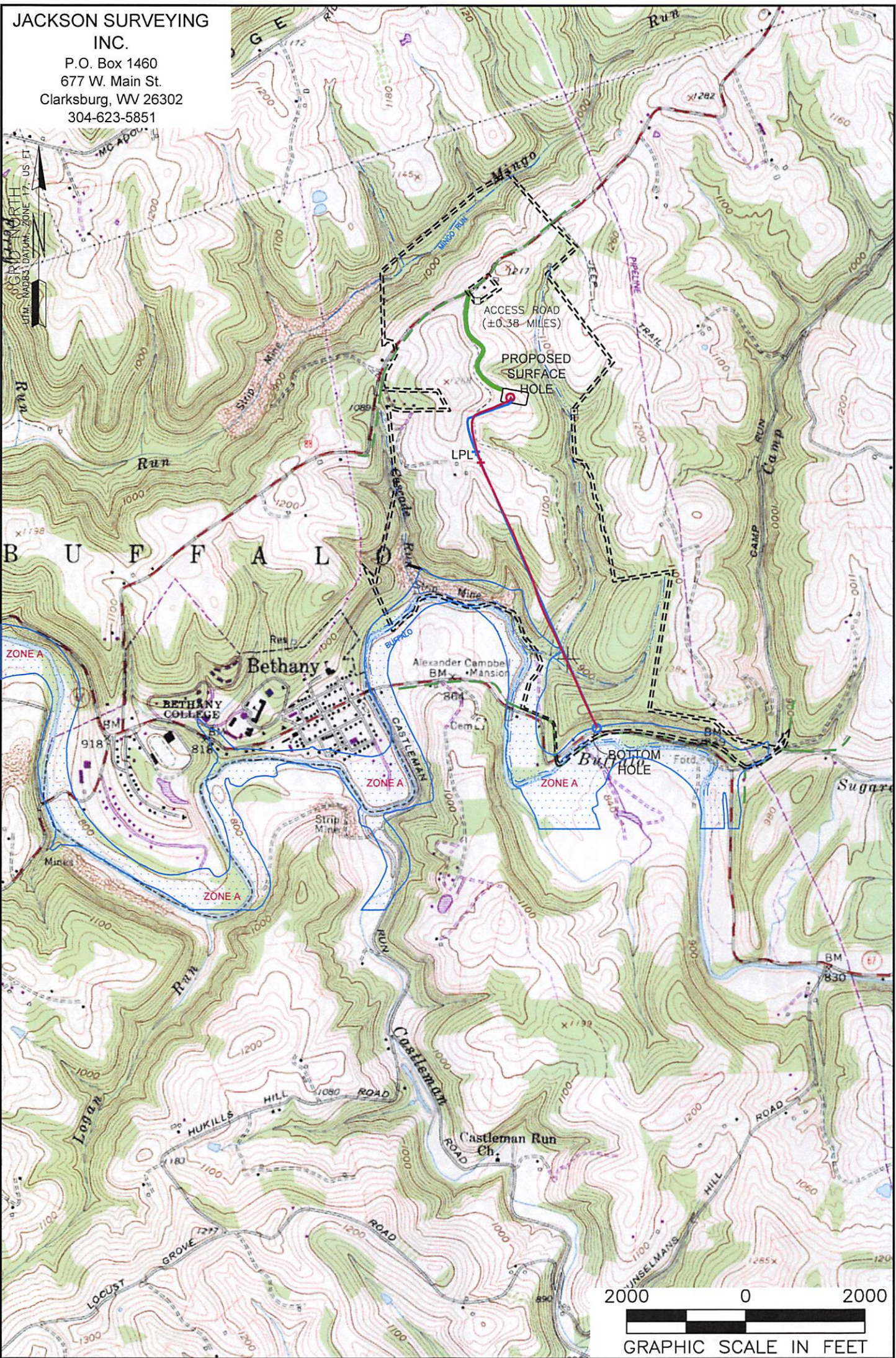
Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided. Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)

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WV Department of
Environmental Protection

**JACKSON SURVEYING
INC.**

P.O. Box 1460
677 W. Main St.
Clarksburg, WV 26302
304-623-5851

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



NOTES ON SURVEY

1. SURFACE AND ROYALTY OWNER INFORMATION AND THEIR BOUNDARIES SHOWN HEREON WERE PLOTTED FROM DEEDS AND/OR TAX PARCEL MAPS PROVIDED BY CLIENT AND/OR FIELD LOCATIONS.
2. THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARCELS SHOWN HEREON.
4. ALL INSETS ARE GRID NORTH UNLESS OTHERWISE DEPICTED.

LEGEND:

- PROPOSED SURFACE HOLE / BOTTOM HOLE
- ⊗ EXISTING / PRODUCING WELLHEAD
- LPL ✕ LANDING POINT LOCATION
- FLOOD PLAIN
- ACCESS ROAD
- PUBLIC ROAD
- ACCESS ROAD TO PREV. SITE
- LEASE BOUNDARY
- PROPOSED PATH
- ASDRILLED PATH

<p>WELL OPERATOR: SWN PRODUCTION COMPANY, LLC</p> <p>ADDRESS: P.O. BOX 1300 JANE LEW, WV 26378</p> <p>SURFACE OWNER: MARK W. OWEN & VIRGINIA BEALL KREUTZ</p>	<p>WELL (FARM) NAME: MARK OWEN BRK</p> <p>WELL # 6H SERIAL #</p> <p>COUNTY - CODE DISTRICT; BROOKE - 009 BUFFALO</p> <p>USGS 7 1/2 QUADRANGLE MAP NAME BETHANY, WV</p>
--	---

Latitude: 40°15'00" N

SURFACE HOLE 1,035'

JACKSON SURVEYING INC.

P.O. Box 1460
677 W. Main St.
Clarksburg, WV 26302
304-623-5851

Latitude: 40°12'30" N

BOTTOM HOLE 11,237'

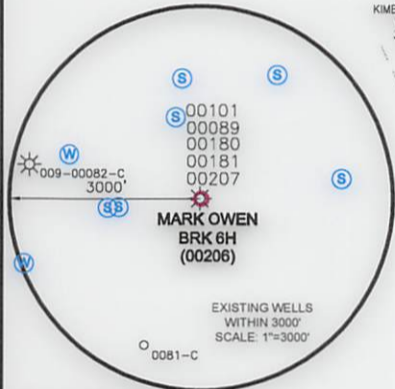
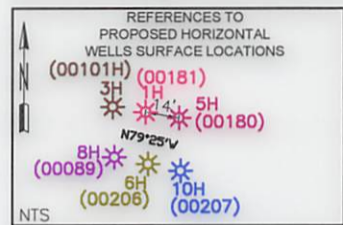
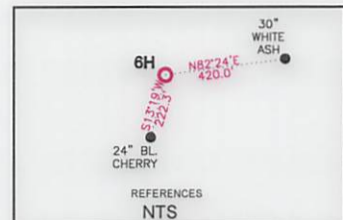
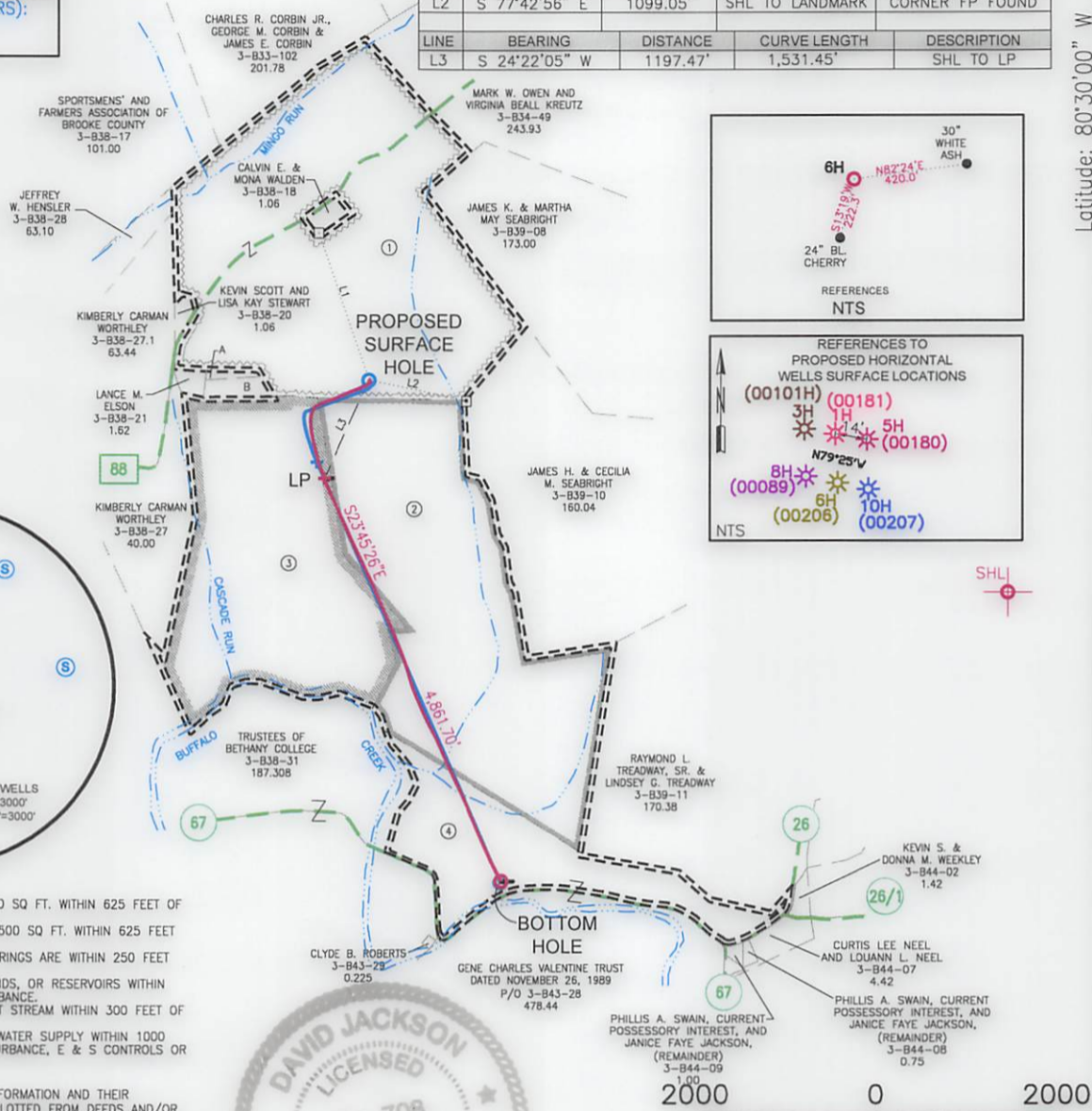
WELL BORE TABLE FOR SURFACE / ROYALTY OWNERS
TRACT SURFACE OWNER(S) / ROYALTY OWNER(R) TAX PARCEL ACRES
1 MARK W. OWEN AND VIRGINIA BEALL KREUTZ (S)
MARK W. OWEN, VIRGINIA BEALL KREUTZ, VIRGINIA W. RUSSELL & JOHN LATROBE (R) 3-B39-19 249.00

SURFACE HOLE LOCATION (SHL):
UTM (NAD83, ZONE 17, METERS):
NORTHING: 4,452,325.579
EASTING: 538,681.637
LANDING POINT (LPL):
UTM (NAD83, ZONE 17, METERS):
NORTHING: 4,451,993.115
EASTING: 538,531.044
BOTTOM HOLE LOCATION (BHL):
UTM (NAD83, ZONE 17, METERS):
NORTHING: 4,450,636.835
EASTING: 539,128.023

SURFACE HOLE LOCATION (SHL):
UTM (NAD83, ZONE 17, METERS):
NORTHING: 4,452,325.579
EASTING: 538,681.640
LANDING POINT (LPL):
UTM (NAD83, ZONE 17, METERS):
NORTHING: 4,452,049.326
EASTING: 538,506.163
BOTTOM HOLE LOCATION (BHL):
UTM (NAD83, ZONE 17, METERS):
NORTHING: 4,450,633.914
EASTING: 539,125.939

LINE BEARING DISTANCE DESCRIPTION MONUMENT
L1 N 19°05'56" W 1711.28' SHL TO LANDMARK 1/2" REBAR FOUND
L2 S 77°42'56" E 1099.05' SHL TO LANDMARK CORNER FP FOUND
L3 S 24°22'05" W 1197.47' CURVE LENGTH 1,531.45' DESCRIPTION SHL TO LP

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



WELL RESTRICTIONS

- 1. NO OCCUPIED DWELLINGS > 2500 SQ FT. WITHIN 625 FEET OF CENTER OF PAD.
2. NO AGRICULTURE BUILDINGS > 2500 SQ FT. WITHIN 625 FEET OF CENTER OF PAD.
3. WATER WELLS OR DEVELOPED SPRINGS ARE WITHIN 250 FEET OF PROPOSED WELL.
4. PERENNIAL STREAMS, LAKES, PONDS, OR RESERVOIRS WITHIN 100 FEET OF THE LIMITS OF DISTURBANCE.
5. NO NATURALLY PRODUCING TROUT STREAM WITHIN 300 FEET OF LIMITS OF DISTURBANCE.
6. NO GROUND INTAKE OR PUBLIC WATER SUPPLY WITHIN 1000 FEET OF WELL PAD, LIMITS OF DISTURBANCE, E & S CONTROLS OR PUBLIC WATER SUPPLY.

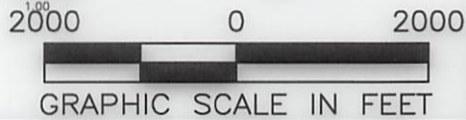
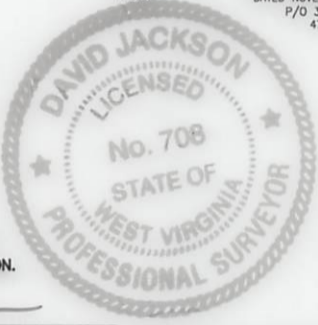
NOTES ON SURVEY

- 1. SURFACE AND ROYALTY OWNER INFORMATION AND THEIR BOUNDARIES SHOWN HEREON WERE PLOTTED FROM DEEDS AND/OR TAX PARCEL MAPS PROVIDED BY CLIENT AND/OR FIELD LOCATIONS.
2. THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARCELS SHOWN HEREON.
4. ALL INSETS ARE GRID NORTH UNLESS OTHERWISE DEPICTED.

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. 708

David J. Jackson



(+) 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)

COMPANY: SWN Production Company, LLC
MARK OWEN BRK
OPERATOR'S WELL #: 6H
API WELL #: 47 009 00206
STATE COUNTY PERMIT

WELL TYPE: OIL WASTE DISPOSAL PRODUCTION DEEP GAS LIQUID INJECTION STORAGE SHALLOW
WATERSHED: BUFFALO CREEK ELEVATION: 1,165.6'
DISTRICT: BUFFALO COUNTY: BROOKE QUADRANGLE: BETHANY, WV
SURFACE OWNER: MARK W. OWEN & VIRGINIA BEALL KREUTZ ACREAGE: ±249.00
OIL & GAS ROYALTY OWNER: MARK W. OWEN, VIRGINIA BEALL KREUTZ, VIRGINIA W. RUSSELL & JOHN LATROBE ACREAGE: ±249.00
DRILL DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION
CONVERT PLUG & ABANDON CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY) ASDRILLED
TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: 6,130 TVD 11,452 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, EXISTING WATER WELL, EXISTING SPRING, SURVEYED BOUNDARY, DRILLING UNIT, LEASE BOUNDARY, ASDRILLED PATH, PROPOSED PATH
REVISIONS: DATE: 06-04-2018
DRAWN BY: N. MANO
SCALE: 1" = 2000'
DRAWING NO:
WELL LOCATION PLAT

**JACKSON SURVEYING
INC.**

P.O. Box 1460
677 W. Main St.
Clarksburg, WV 26302
304-623-5851

WELL BORE TABLE FOR SURFACE / ROYALTY OWNERS			
TRACT	SURFACE OWNER (S) / ROYALTY OWNER (R)	TAX PARCEL	ACRES
1	MARK WEAVER OWEN AND VIRGINIA BEALL KREUTZ (S/R)	X-B39-19	249.00
TRACT	SURFACE OWNER	TAX PARCEL	ACRES
2	KIMBERLY CARMEN (LIFE: EMMA LOU CARMAN)	X-B38-25	136.00
3	MARK OWEN AND VIRGINIA BEALL KREUTZ	X-B38-24	188.00
4	GENE CHARLES VALENTINE TRUST OF 11-12-86	X-B43-28	479.439

ADJOINING OWNERS TABLE			
TRACT	SURFACE OWNER	TAX PARCEL	ACRES
A	NOLTE & GLADYS VAN CAMP AS TRUSTEES OF THE 11-04-02 VAN CAMP FAMILY TRUST	X-B38-22	0.94
B	NOLTE & GLADYS VAN CAMP AS TRUSTEES OF THE 11-04-02 VAN CAMP FAMILY TRUST	X-B38-23	2.27
C	MORRIS G. MAIN	X-B44-09	1.00
D	MORRIS G. MAIN	X-B44-08	0.75
E	CURTIS LEE NEAL AND LOUANN L. NEAL	X-B44-07	3.97

REVISIONS:	COMPANY:	 	
	OPERATOR'S	MARK OWENS BRK	
	WELL #:	6H	
	DISTRICT:	COUNTY:	STATE:
	BUFFALO	BROOKE	WV
			DATE: 06-04-2018
			DRAWN BY: N. MANO
			SCALE: N/A
			DRAWING NO:
			WELL LOCATION PLAT 2