

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

API 47-009-00207 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 10H  
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 4,452,324.750 Easting 538,685.763  
Landing Point of Curve Northing 4,452,096.455 Easting 539,051.462  
Bottom Hole Northing 4,450,692.802 Easting 539,676.925

Elevation (ft) 1,165.5' 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 09/01/2017 Date drilling commenced 11/26/2017 Date drilling ceased 02/11/2018  
Date completion activities began 04/22/2018 Date completion activities ceased 05/09/2018  
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. W. L. 8/30/18*

Reviewed by

*CB 8/30/18*

09/07/2018

API 47- 009 - 00207

Farm name OWEN, MARK

Well number MARK OWEN BRK 10H

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	413'	NEW	J-55/54.50#		Y, 20 bbls
Coal	SEE SURFACE						
Intermediate 1	12.25	9.625	1,734'	NEW	J-55/36#		Y, 30 bbls
Intermediate 2							
Intermediate 3							
Production	8.75/8.50	5.5	11,815'	NEW	HCP-110/20#		Y
Tubing		2.375	6,508'	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 <sup>3</sup> /sks)	Volume (ft <sup>3</sup> )	Cement Top (MD)	WOC (hrs)
Conductor	CLASS A	GROUT TO SURFACE	15.60	1.20		SURFACE	24
Surface	CLASS A	406	15.60	1.20	487.2	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	2,084	15.60	1.19	2,479.96	SURFACE	24
Tubing							

Drillers TD (ft) 11,815' Loggers TD (ft) 11,815'

Deepest formation penetrated MARCELLUS Plug back to (ft) N/A

Plug back procedure N/A

Kick off depth (ft) 5,372

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 \_\_\_\_\_

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WERE TRACERS USED  Yes  No TYPE OF TRACER(S) USED \_\_\_\_\_

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**MARK OWEN BRK 10H  
ATTACHMENT 1  
PERF REPORT**

STAGE NUM	Perf Date	Perf Top MD	Perf Bottom MD	# SHOTS PER STG
1	4/2/2018	11,701	11,594	42
2	4/23/2018	11,561	11,454	42
3	4/23/2018	11,421	11,314	42
4	4/23/2018	11,281	11,174	42
5	4/23/2018	11,141	11,034	42
6	4/24/2018	11,001	10,894	42
7	4/24/2018	10,861	10,754	42
8	4/24/2018	10,723	10,614	42
9	4/24/2018	10,581	10,479	42
10	4/24/2018	10,441	10,334	42
11	4/25/2018	10,301	10,194	42
12	4/25/2018	10,161	10,054	42
13	4/25/2018	10,019	9,914	42
14	4/28/2018	9,881	9,774	42
15	4/28/2018	9,741	9,634	42
16	4/29/2018	9,601	9,497	42
17	4/29/2018	9,461	9,354	42
18	4/29/2018	9,321	9,214	42
19	4/29/2018	9,181	9,074	42
20	4/29/2018	9,041	8,934	42
21	4/30/2018	8,901	8,794	42
22	4/30/2018	8,757	8,654	42
23	4/30/2018	8,621	8,511	42
24	4/30/2018	8,482	8,374	42
25	4/30/2018	8,341	8,234	42
26	4/30/2018	8,201	8,084	42
27	5/1/2018	8,059	7,954	42
28	5/1/2018	7,921	7,817	42
29	5/1/2018	7,781	7,674	42
30	5/1/2018	7,641	7,534	42
31	5/1/2018	7,501	7,394	42
32	5/1/2018	7,361	7,254	42
33	5/2/2018	7,221	7,115	42
34	5/2/2018	7,081	6,974	42
35	5/2/2018	6,940	6,834	42
36	5/2/2018	6,801	6,691	42
37	5/2/2018	6,661	6,554	42

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**MARK OWEN BRK 10H  
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	4/22/2018	89.5	7,074	4,551	4,595	279,700	6,066	0
2	4/23/2018	87	6,865	6,251	4,803	279,500	4,616	0
3	4/23/2018	89.5	6,878	5,801	4,750	281,380	4,661	0
4	4/23/2018	89.1	6,836	3,951	4,667	282,360	5,177	0
5	4/23/2018	90.3	7,007	4,440	4,587	280,210	5,024	0
6	4/24/2018	89.7	7,121	5,922	5,057	279,440	4,615	0
7	4/24/2018	90.2	6,728	5,333	4,566	280,300	4,098	0
8	4/24/2018	88.6	6,975	6,080	4,780	281,580	4,113	0
9	4/24/2018	91.2	7,286	4,061	4,826	280,440	5,053	0
10	4/25/2018	90.3	6,555	5,421	4,518	280,400	3,981	0
11	4/25/2018	90.3	6,864	4,282	4,843	278,670	4,045	0
12	4/25/2018	90	6,904	6,545	4,760	279,960	4,090	0
13	4/28/2018	87.2	6,880	8,427	4,708	280,900	3,955	0
14	4/28/2018	90	6,848	7,870	4,822	280,040	4,105	0
15	4/28/2018	89.8	6,860	6,339	4,553	281,370	4,152	0
16	4/29/2018	89.4	6,648	5,425	4,555	280,030	4,154	0
17	4/29/2018	89.4	6,768	5,976	4,519	281,000	4,099	0
18	4/29/2018	89	6,757	5,855	4,357	281,250	4,128	0
19	4/29/2018	85.2	6,338	6,357	4,755	280,060	4,057	0
20	4/29/2018	89.6	6,649	6,519	5,068	280,060	4,069	0
21	4/30/2018	90.2	6,369	6,659	4,621	279,540	4,002	0
22	4/30/2018	91.6	6,645	6,156	4,686	280,280	4,057	0
23	4/30/2018	90.6	6,486	5,801	4,583	279,990	4,059	0
24	4/30/2018	90.2	6,648	6,497	4,892	279,550	4,010	0
25	4/30/2018	89.6	6,501	6,716	4,913	280,570	4,417	0
26	5/1/2018	90.5	6,486	6,629	4,591	280,440	3,971	0
27	5/1/2018	91	6,538	6,496	4,996	279,970	3,963	0
28	5/1/2018	90.7	6,463	6,112	4,824	279,850	3,967	0
29	5/1/2018	90.3	6,279	5,291	4,697	279,730	3,972	0
30	5/1/2018	91.3	6,214	6,159	4,963	280,150	3,920	0
31	5/1/2018	89.9	5,952	6,137	4,865	280,230	4,305	0
32	5/2/2018	90.9	6,341	6,885	4,791	280,370	3,896	0
33	5/2/2018	89.9	6,369	6,579	4,789	280,140	3,881	0
34	5/2/2018	90	6,308	6,298	4,603	280,080	3,872	0
35	5/2/2018	89.9	6,084	6,166	4,976	280,230	3,858	0
36	5/2/2018	90.6	6,059	6,429	4,345	290,000	3,967	0
37	5/2/2018	90.7	6,125	6,587	4,246	287,030	4,073	0

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Well Name: Mark Owen BRK 10H

47009002070000

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)	5907.00	5773.00	6000.00	5841.00	
Burket (shale)	6000.00	5841.00	6023.00	5857.00	
Tully (ls)	6023.00	5857.00	5107.00	5910.00	
Mahantango (shale)	5107.00	5910.00	6437.00	6041.00	
Marcellus (shale)	6437.00	6041.00	NA	NA	GAS

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**5D Survey Report**

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**SOUTHWESTERN ENERGY**

**Field Name:** *SOUTHWESTERN\_BROOKE CO, WV UTM NAD 83  
(17N)*

**Site Name:** *Mark Owen Pad*

**Well Name:** *Mark Owen BRK 10H*

**Survey:** *Definitive survey*

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13 February 2018

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# Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	4/22/2018
Job End Date:	5/2/2018
State:	West Virginia
County:	Brooke
API Number:	47-009-00207-00-00
Operator Name:	Southwestern Energy
Well Name and Number:	Mark Owen BRK 10H
Latitude:	40.22045100
Longitude:	-80.54532500
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,154
Total Base Water Volume (gal):	6,296,799
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	82.72715	
Sand	J.S. Well Services, LLC	Proppant	Crystalline Silica, quartz	14808-60-7	100.00000	16.36229	
HCL Acid (12.6%-17.5%)	J.S. Well Services, LLC	Bulk Acid	Water	7732-18-5	87.40000	0.67106	
WFRA-2000	J.S. Well Services, LLC	Friction Reducer	Hydrogen Chloride	7647-01-0	17.50000	0.15602	
			Water	7732-18-5	60.00000	0.03204	
			2-Propenoic acid, polymer with 2	9003-06-9	30.00000	0.01602	
			propanamide				
			Hydrated light distillate (petroleum)	64742-47-8	30.00000	0.01314	
			Methanol	64-17-5	60.00000	0.00952	
			Benzyl-(C12-C16 Alkyl)-Dimethyl-Ammonium Chloride	68424-85-1	30.00000	0.00605	
			Glutaraldehyde	111-30-8	10.00000	0.00202	

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SCAL16486A	Nalco Champion	Scale Inhibitor					
			Ethylene Glycol	107-21-1	30.00000	0.00170	
			Amine Triphosphate	Proprietary	30.00000	0.00152	
AI-303	J.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Ethylene glycol	107-21-1	40.00000	0.00033	
			Cinnamaldehyde	104-55-2	20.00000	0.00012	
			Formic acid	64-18-6	20.00000	0.00012	
			Butyl cellosolve	111-76-2	20.00000	0.00011	
			Polyether	50828-78-6	10.00000	0.00006	
			Acetophenone,thiourea,formaldehyde polymer	58527-49-1	5.00000	0.00003	
LT FLUSH SYSTEM I	J.S. Well Services, LLC	Other					
			Mineral oil, petroleum distillates, hydroreated light naphthenic	64742-53-6	100.00000	0.00074	

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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**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)	3-B39-19	249.00
TRACT	SURFACE OWNER	TAX PARCEL	ACRES
2	MARK OWEN AND VIRGINIA BEALL KREUTZ	3-B38-24	188.00
3	JAMES H. & CECILIA M. SEABRIGHT	3-B39-10	160.04
4	RAYMOND L. TREADWAY, SR. & LINDSEY G. TREADWAY	3-B39-11	170.38

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

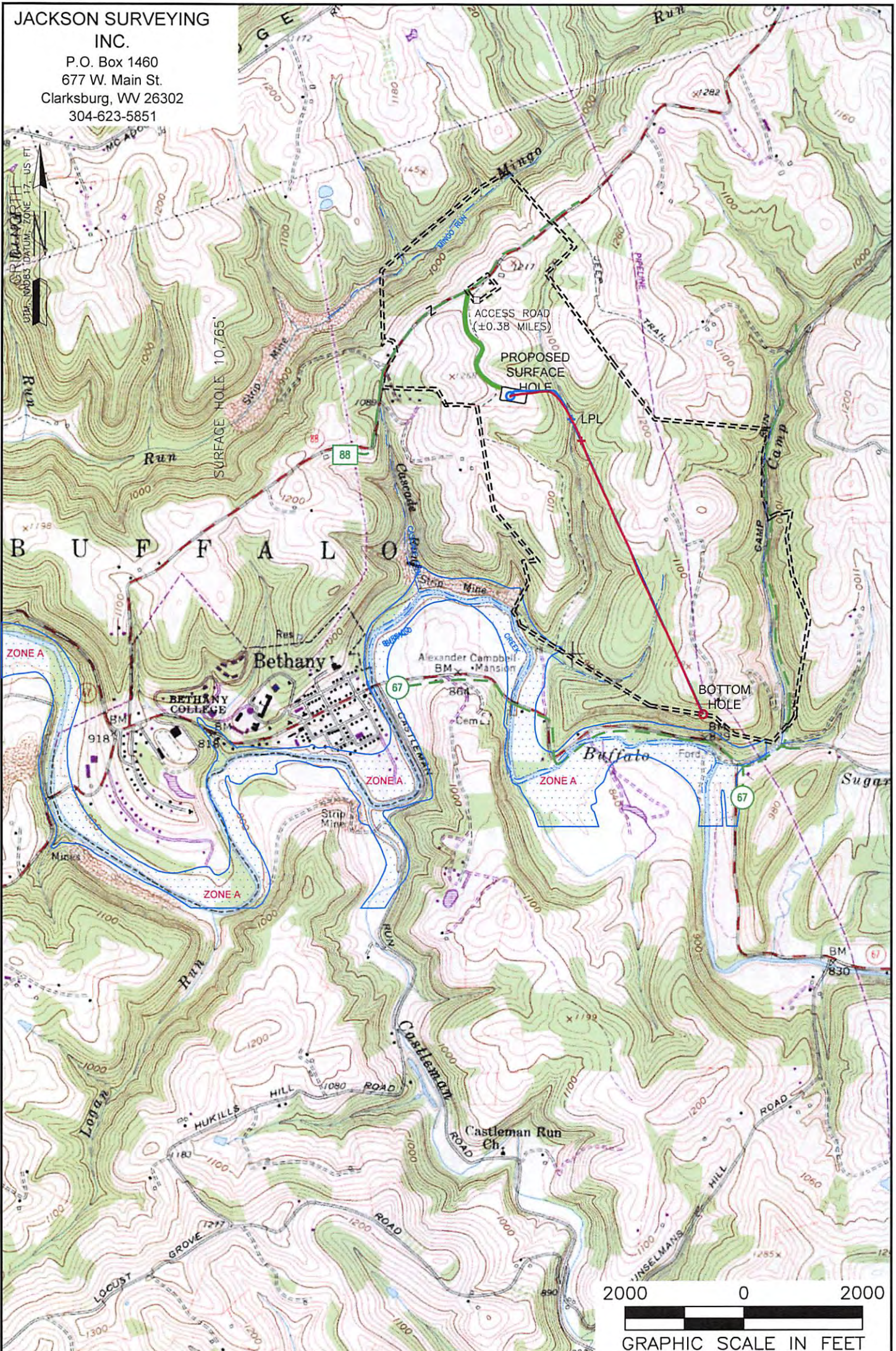
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REVISIONS:	COMPANY:			 	
	OPERATOR'S			MARK OWENS BRK	
	WELL #:			10H	
	DISTRICT:	COUNTY:	STATE:	DATE: 06-04-2018	
	BUFFALO	BROOKE	WV	DRAWN BY: N. MANO	
				SCALE: N/A	
				DRAWING NO:	
				WELL LOCATION PLAT 2	



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**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.
3. ALL INSETS ARE GRID NORTH UNLESS OTHERWISE DEPICTED.

**LEGEND:**

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

09/07/2018

<p><b>WELL OPERATOR:</b> SWN PRODUCTION COMPANY, LLC</p> <p><b>ADDRESS:</b> P.O. BOX 1300 JANE LEW, WV 26378</p> <p><b>SURFACE OWNER:</b> MARK W. OWEN &amp; VIRGINIA BEALL KREUTZ</p>	<p><b>WELL (FARM) NAME:</b> MARK OWEN BRK</p> <p><b>WELL #</b> 10H    <b>SERIAL #</b></p> <p><b>COUNTY - CODE</b>    <b>DISTRICT;</b> <b>BROOKE - 009</b>    <b>BUFFALO</b></p> <p><b>USGS 7 1/2 QUADRANGLE MAP NAME</b> BETHANY, WV</p>
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