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west virginia department of environmental protection

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Office of Oil and Gas  
601 57<sup>th</sup> Street, S.E.  
Charleston, WV 25304  
(304) 926-0450  
fax: (304) 926-0452

Austin Caperton, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

Monday, March 19, 2018  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / Horizontal 6A Well - 1

SWN PRODUCTION COMPANY, LLC  
POST OFFICE BOX 12359

SPRING, TX 773914954

Re: Permit Modification Approval for B & W EDGE MSH 5H  
47-051-01845-00-00

Modified Casing, Schematic, 6A1

SWN PRODUCTION COMPANY, LLC

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin  
Chief

Operator's Well Number: B & W EDGE MSH 5H  
Farm Name: EDGE, WILLIAM F. JR. & BARBARA  
U.S. WELL NUMBER: 47-051-01845-00-00  
Horizontal 6A Horizontal 6A Well - 1  
Date Modification Issued: March 19, 2018

Promoting a healthy environment.

4705101845:mad

WW-6B  
(9/13)

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
WELL WORK PERMIT APPLICATION

1) Well Operator: SWN Production Co., LLC 49447757 51- Marshall 6- Sand Hill 647-Wheeling  
Operator ID County District Quadrangle

2) Operator's Well Number: B W Edge MSH 5H Well Pad Name: B W Edge MSH Pad

3) Farm Name/Surface Owner: William F. Jr., & Barbara Edge Public Road Access: Big Wheeling Creek Road

4) Elevation, current ground: 1254' Elevation, proposed post-construction: 1254'

5) Well Type (a) Gas  Oil  Underground Storage

Other

(b) If Gas Shallow  Deep

Horizontal

6) Existing Pad: Yes or No yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):  
Target formation- Marcellus Target top TVD- 6387' Target base TVD- 6403' Anticipated thickness- 36' Associated Pressure- 4146

8) Proposed Total Vertical Depth: 6377'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 15433'

11) Proposed Horizontal Leg Length: 8,587.65'

12) Approximate Fresh Water Strata Depths: 615'

13) Method to Determine Fresh Water Depths: No Wells on pad. Closest water well discovered from baseline data: Palmer Approx. 2600' downfill and in the direction of surface drainage, must be verified through safety one.

14) Approximate Saltwater Depths: 930' Michael Southworth 8PH WR-35 depth is 950' and shifted is 930' TVD. Open hole logs for the purpose of salinity analysis necessary.

15) Approximate Coal Seam Depths: 748'

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16) Approximate Depth to Possible Void (coal mine, karst, other): none that we are aware of. MAR 8 2018

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes  No  WV Department of Environmental Protection

(a) If Yes, provide Mine Info: Name: Shoemaker

Depth: 669'

Seam: Pittsburgh Seam

Owner: Shoemaker

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Mad Rec March 8, 2018

18) CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	20"	New	H-40	94#	100'	100'	CTS
Fresh Water	13 3/8"	New	H-40	48#	800'	800'	739 sx/CTS
Coal	9 5/8"	New	J-55	36#	2200'	2200'	817 sx/CTS
Intermediate	7"	New	J-55	20#	If Needed	If Needed	If Needed/As Needed
Production	5 1/2"	New	HCP-110	20#	15433'	15433'	<small>spec 757x Tail 2183x inside intermediate</small>
Tubing	2 3/8"	New	HCP-110	4.7#	Approx. 6377'	Approx. 6377'	
Liners							

*Handwritten signature*  
10/14/17

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	30"	0.25	2120	81	Class A	1.19/50% Excess
Fresh Water	13 3/8"	17.5"	0.380	2740	633	Class A	1.19/50% Excess
Coal	9 5/8"	12 1/4"	0.395	3950	1768	Class A	1.19/50% Excess
Intermediate	7"	8 3/4"	0.317	4360	3250	Class A	1.20/50% Excess
Production	5 1/2"	8 3/4"	0.361	12360	9500	Class A	1.20/50% Excess
Tubing	2 3/8"	4.778"	0.190	Approx 8193'	Approx 8193'		
Liners							

PACKERS

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MAR 8 2018

Kind:	10K Arrowset AS-1X				WV Department of Environmental Protection
Sizes:	5 1/2"				
Depths Set:					

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OCT 16 2017

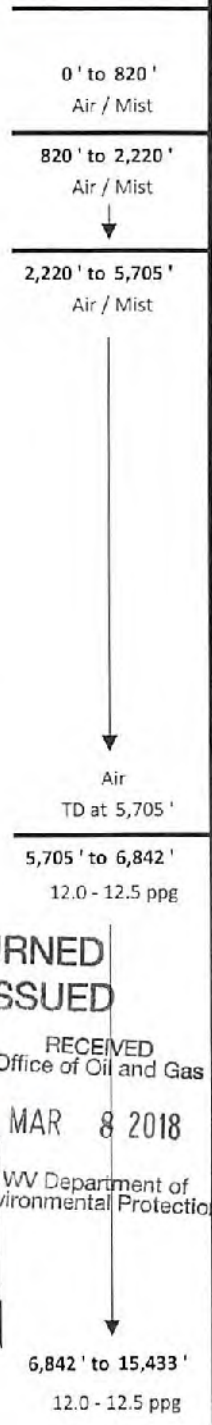
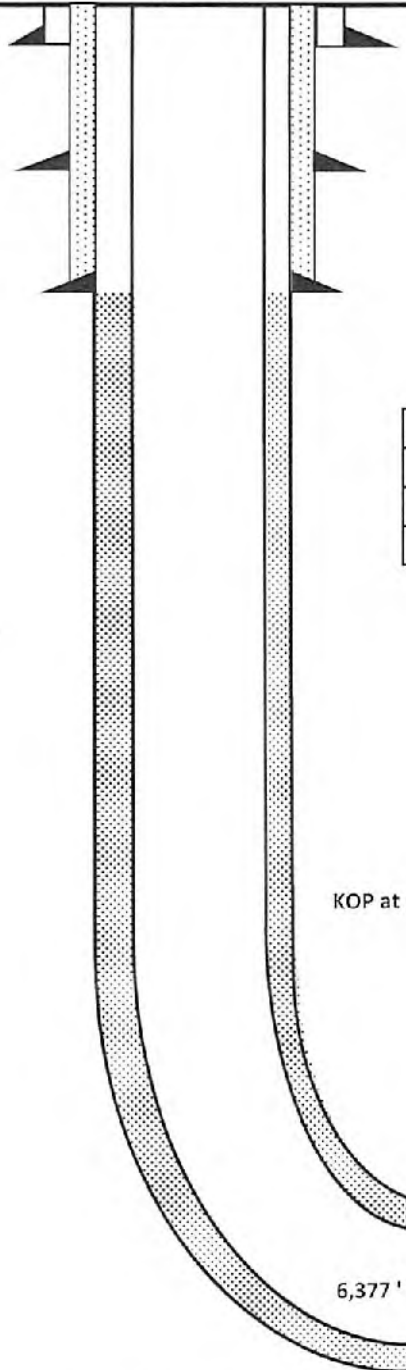
WV Department of Environmental Protection

Southwestern Energy Company

Proposed Drilling Program

Well: BW EDGE MSH 5  
 Field: PANHANDLE FIELD \\  
 County: MARSHALL  
 SHL: 40.0066 Latitude -80.6274 Longitude  
 BHL: 40.0291 Latitude -80.6384 Longitude  
 KB Elev: 1,280 ft MSL KB: 26 ft AGL GL Elev: 1,254 ft MSL

Re-entry Rig: TBD  
 Prospect: PANHANDLE  
 State: WV



Tubular Detail

	Size (in)	Weight	Grade	From	To
Conductor	20	94.0 #	H-40	0'	100'
Surface	13.375	48.0 #	H-40	0'	800'
Intermediate	9.625	36.0 #	J-55	0'	2,200'
Production	5.5	20.0 #	HCP-110	0'	15,433'

Cement Detail

	Sacks	Class	Density
Conductor	151	A	19.3
Surface	739	A	15.6
Intermediate	817	A	15.6
Production Lead	757	A	15.6
Production Tail	2183	A	15.6

Water Depth - 615' TVD  
 Coal Depth - 748' TVD  
 TVD - 6,377'  
 TMD - 15,433'

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 NOT ISSUED

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EOB at 6,377' TVD

SHL Onondaga 6,413' TVD

Created by: C R Hall on 10/03/2017

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WW-6A1  
(5/13)

Operator's Well No. B&W Edge MSH 5H

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE  
Chapter 22, Article 6A, Section 5(a)(5)  
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that -

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
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SEE EXHIBIT "A"

**Acknowledgement of Possible Permitting/Approval  
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

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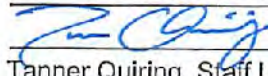
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The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated. RECEIVED  
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Well Operator: SWN Production Company LLC

MAR 8 2018

By: 

WV Department of  
Environmental Protection

Its: Tanner Quiring, Staff Landman

4705101845 mor

EXHIBIT "A"  
 Attached to and made a part of the State of West Virginia Oil and Gas Permit Form, WW-6A1, by SWN Production Company, LLC, Operator,  
 SW Edge MSH 5H  
 Marshall Ohio Counties, West Virginia

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#	TMP	SURFACE OWNER	DEEDED ACREAGE	LEASE #	LESSOR	LESSEE	ROYALTY	DATE
1)	12-9-8	William F. Jr. and Barbara Edge	87.85	733642-000	Josephine Fletcher	NPAR LLC Chevron Chesapeake Appalachia LLC. SWN Production Company LLC.	20.00%	2018
2)	12-9-8.1	William F. Jr. and Barbara Edge	28.00	733642-000	Josephine Fletcher	NPAR LLC Chevron Chesapeake Appalachia LLC. SWN Production Company LLC.	20.00%	2018
3)	12-1-19	Edith Adell Fejmar, a widow	112.623	Pending	Edith Adell Fejmar, a widow	SWN Production Company LLC.	18.00%	2018
4)	12-1-18	Mark A. Schellhase and Andrea K. Schellhase	93.83	728992-000	Mark A. Schellhase and Andrea K. Schellhase	Chesapeake Appalachia L.L.C. SWN Production Company L.L.C.	18.00%	2018
5)	12-1-18.3	Violet S. Miller	7.99	733674-000	Violet S. Miller	Tri Energy Holdings L.L.C. NPAR LLC Chevron USA, Inc. Chesapeake Appalachia L.L.C. SWN Production Company L.L.C.	16.00%	2018
6)	12-1-18.4	Stephen M. Bartolovich	10.00	744441-000	Stephen M. Bartolovich	SWN Production Company L.L.C.	18.00%	2018
7)	12-1-11	Stephen M. Bartolovich	48.46	744441-000	Stephen M. Bartolovich	SWN Production Company L.L.C.	18.00%	2018
8)	12-1-13	Michael L. Coffield and Tylena R. Coffield	71.58	726891-000	Michael L. Coffield and Tylena R. Coffield	Chesapeake Appalachia L.L.C. SWN Production Company L.L.C.	18.75%	2018
9)	12-1-10.1	Walter Lewis Hartman and Gloria Louise Hartman	47.81	725884-000	Walter Lewis Hartman and Gloria Louise Hartman	Chesapeake Appalachia L.L.C. SWN Production Company L.L.C.	12.50%	2018
10)	6-11-15	Raymond A. Cappone and Karen Cappone	22.228	Pending	Raymond A. Cappone and Karen Cappone	SWN Production Company L.L.C.	18.00%	2018

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47051018451 mod

SWN Production Company, LLC  
P O Box 12359  
Spring, Texas 77391-2359  
www.swn.com

October 12, 2017

Ms. Laura Adkins  
WV DEP Office of Oil & Gas  
601 57<sup>th</sup> St., SE  
Charleston, WV 25304

**RE:** SWN's proposed new Well: B W Edge MSH 5H & B W Edge MSH 205H in Marshall County, West Virginia, Drilling under Walnut Grove Road.

Dear Ms. Adkins:

SWN Production Company, LLC ("SWN") is applying for a drilling permit for the above referenced well. The State of West Virginia has raised some concern as to SWN's right to drill under Walnut Grove Road. Please be advised that SWN has leased all mineral owners under said route as it relates to the above-referenced well and unit.

Thank you.

Sincerely,

Tanner Quiring  
Staff Landman  
SWN Production Company, LLC  
PO Box 1300  
Jane Lew, WV 26378

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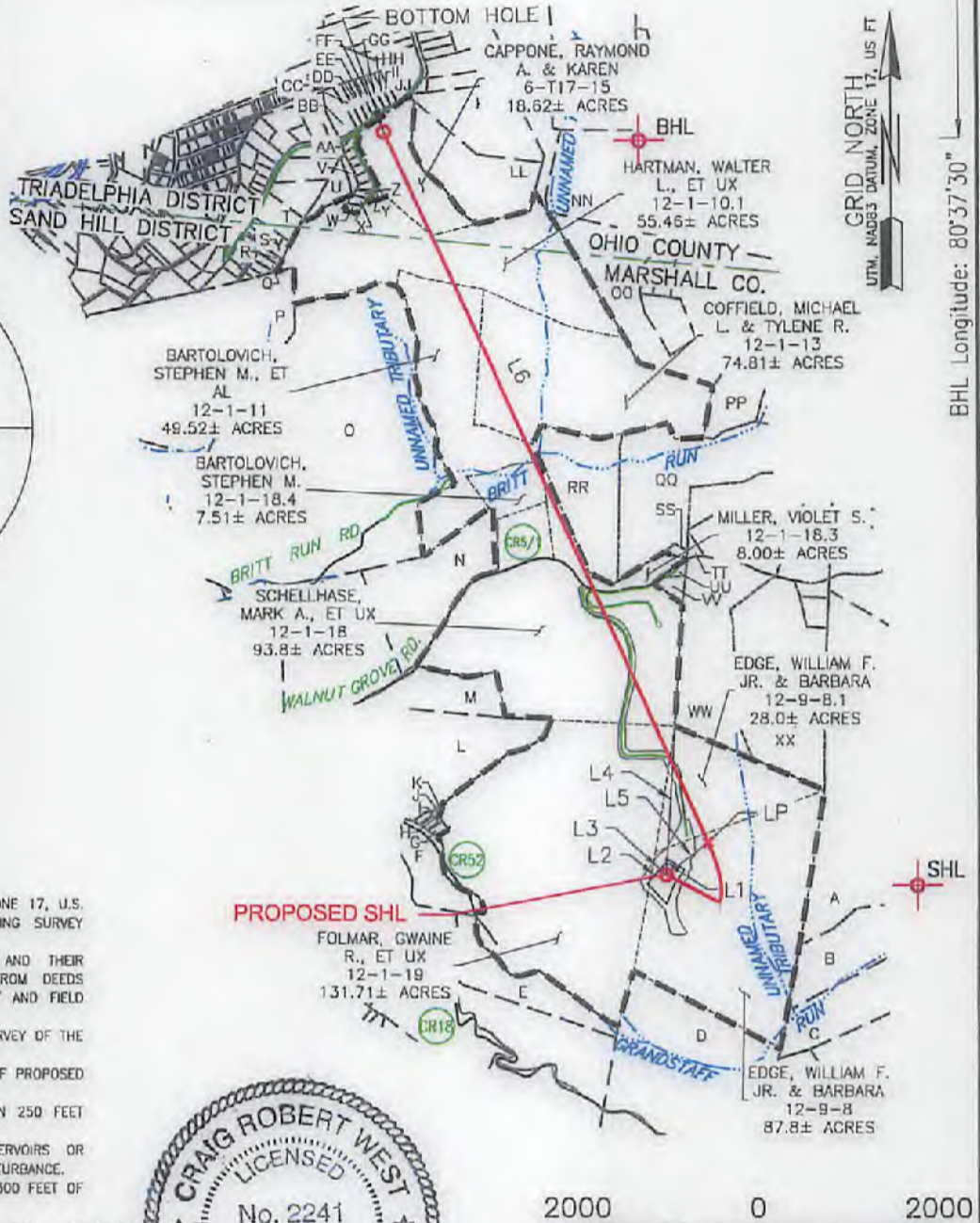
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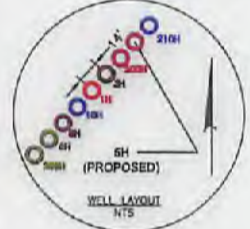
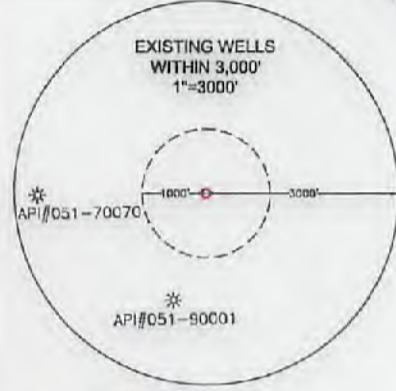
**RETTEW Associates, Inc.**  
 27 Travato Street, Suite 101  
 Bridgeport, WV 26330  
 Phone (800) 738-8395  
 Email: rettetw@rettetw.com  
 Website: www.rettetw.com

LINE	DESCRIPTION	DISTANCE	DESCRIPTION	MONUMENT
L1	N02°36'07"W	185'	SHL TO REF. PIN	IRON PIN
L2	N80°26'40"W	218'	SHL TO REF. PIN	IRON PIN
L3	N47°34'13"W	192'	SHL TO LANDMARK	POST
L4	N03°24'04"E	1,628'	SHL TO LANDMARK	REBAR
L5	N52°24'43"E	549'	SHL TO LP	
L6	N24°25'24"W	8,587.65'	LP TO BHL	

**ADJOINING OWNER INFORMATION**  
 (SEE ADJOINING OWNER SHEET)



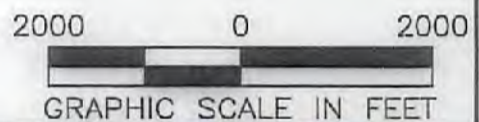
SURFACE HOLE LOCATION (SHL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,428,556.883' EASTING: 531,798.328'
"LANDING POINT" LOCATION (LPL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,428,664.715' EASTING: 531,938.271'
BOTTOM HOLE LOCATION (BHL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,431,048.009' EASTING: 530,855.991'



**NOTES ON SURVEY**

- COORDINATES SYSTEM IS UTM, NAD 83 DATUM, ZONE 17, U.S. FOOT AND WELL COORDINATES ESTABLISHED USING SURVEY GRADE GPS.
- 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.
- THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARCELS SHOWN HEREON.
- NO DWELLINGS AND BUILDINGS WITHIN 625 FEET OF PROPOSED CENTER OF PAD.
- NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF PROPOSED WELL.
- NO PERENNIAL STREAMS, LAKES, PONDS, RESERVOIRS OR WETLANDS WITHIN 100 FEET OF THE LIMITS OF DISTURBANCE.
- NO NATURALLY PRODUCING TROUT STREAM WITHIN 300 FEET OF LIMITS OF DISTURBANCE.

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. 2241

(+) 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 SURVEY SOURCE OF GRADE GPS ELEVATION: (NAVD 88, US FT)	COMPANY: <b>SWN</b> Production Company, LLC OPERATOR'S WELL #: 5H API WELL #: 47 051 01845 STATE COUNTY PERMIT
	WELL TYPE: OIL <input type="checkbox"/> WASTE DISPOSAL <input type="checkbox"/> PRODUCTION <input checked="" type="checkbox"/> DEEP <input type="checkbox"/> GAS <input checked="" type="checkbox"/> LIQUID INJECTION <input type="checkbox"/> STORAGE <input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/>	WATERSHED: UPPER OHIO SOUTH DISTRICT: SAND HILL COUNTY: MARSHALL SURFACE OWNER: EDGE, WILLIAM F. JR. & BARBARA OIL & GAS ROYALTY OWNER: FLETCHER, JOSEPHINE

DRILL <input checked="" type="checkbox"/> DRILL DEEPER <input type="checkbox"/> REDRILL <input type="checkbox"/> FRACTURE OR STIMULATE <input checked="" type="checkbox"/> PLUG OFF OLD FORMATION <input type="checkbox"/> PERFORATE NEW FORMATION <input type="checkbox"/> CONVERT <input type="checkbox"/> PLUG & ABANDON <input type="checkbox"/> CLEAN OUT & REPLUG <input type="checkbox"/> OTHER CHANGE <input type="checkbox"/> (SPECIFY) _____ TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: 6,377' TVD 15,433' TMD	WELL OPERATOR: SWN PRODUCTION COMPANY, LLC ADDRESS: P.O. BOX 1300 CITY: JANE LEW STATE: WV ZIP CODE: 26378	DESIGNATED AGENT: DEE SOUTHALL ADDRESS: P.O. BOX 1300 CITY: JANE LEW STATE: WV ZIP CODE: 26378
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<b>LEGEND:</b> ● PROPOSED SURFACE HOLE / BOTTOM HOLE * EXISTING / PRODUCING WELLHEAD ⊗ ABANDONED WELL ⊕ PLUGGED & ABANDONED WELL △ CUT CONDUCTOR	--- TIE LINE - - - LEASE BOUNDARY - - - MARCELLUS DHP - - - ABANDONED PATH	REVISIONS: DATE: 04-07-2017 DRAWN BY: W. McCLEAF SCALE: 1" = 2000' DRAWING NO: 087569005 WELL LOCATION PLAT
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# RETTEW<sup>SM</sup>

RETTEW Associates, Inc.  
27 Travato Street, Suite 101  
Bridgeport, WV 26330  
Phone (800) 738-8395  
Email: rettetw@rettetw.com  
Website: www.rettetw.com

TRACT	ADJOINING PROPERTY OWNERS	TAX PARCEL	ACRES
A	GIZA, CHESTER A., ET UX	12-2-14	59.15±
B	ISALY, ROBERT A. SR., EST	12-2-13	12.50±
C	GIBSON, WILLIAM & LORI ANN	12-9-12	31.11±
D	ISALY, ROBERT A. SR., EST	12-9-9	58.05±
E	WHEELING CREEK WATERSHED COMMUNITY	12-9-6-1	18.40±
F	HADSELL, SANDRA L.	12-1-20	11.14±
G	KENNEDY, GRACE ANN	12-1-22	0.44±
H	FRAZIER, GREGORY SCOTT	12-1-23	0.12±
I	MUFFENY, PAULA SUE	12-1-27	0.08±
J	FRAZIER, GREGORY SCOTT	12-1-27-1	0.05±
K	MUFFENY, PAULA SUE	12-0-27-2	0.05±
L	ADASE, GEORGE & LAURIE	12-1-28	29.71±
M	ADASE, GEORGE & LAURIE	12-1-29	32.23±
N	LEASURE, ANNA	12-1-30	27.25±
O	COFFIELD, MICHAEL L. & TYLENE R.	12-1-10	182.86±
P	HAMILTON, MARY SCHENK & GARY P.	12-1-5-1	87.77±
Q	SNYDER, LONNIE A.	12-1A-83	0.60±
R	SNYDER, LONNIE A.	12-1A-83-2	0.48±
S	STALEY, DAVID A., ET UX	12-1A-77	0.94±
T	YOUNG, ALBERT R. SR.	6-T17B-321	2.24±
U	HARTMAN, WALTER L. & GLORIA L.	6-T17-17	3.95±
V	HETZEL, JERALD L. & KIMBERLY E.	6-T17-17-1	0.80±
W	HOLMES, DANIEL P. & LAURA S.	6-T17-17-2	0.30±
X	FERRER, DEBRA A.	6-T17-17-3	0.30±
Y	HARTMAN, WALTER L. & GLORIA L.	6-T17-17-11	0.90±
Z	HALL, JOSEPH D. & ANGEL L.	6-T17-17-4	0.32±
AA	HARTMAN, WALTER L. & GLORIA L.	6-T17C-4-1	6.08±
BB	HARTMAN, WALTER L. & GLORIA L.	6-T17C-4	2.35±
CC	TAYLOR, JACK M. & G. J.	6-T17C-5-3	0.97±
DD	WOODS, MARSHA M.	6-T17C-5-4	0.81±
EE	BONAR, RICHARD A. & C. K.	6-T17C-5-2	0.77±
FF	MCCONNELL, ROBERT JEFFREY	6-T17C-5-1	0.74±
GG	KUHL, MARY ANN & ETTER ARNOLD JR.	6-T17C-5	0.72±
HH	KING, STEPHANIE M.	6-T17C-6	0.69±
II	KENT, TERRY L.	6-T17C-7	0.71±
JJ	STRAIGHT, SAMUEL E.	6-T17C-8	4.10±
KK	BEALL, GREGORY W. & JILL ANN	6-T17-9-1	16.85±
LL	BEALL, GREGORY W. & JILL ANN	6-T17-9-3	20.97±
MM	RIDGE RUNNER FARM LLC	6-T12-14	0.60±
NN	DAVIS, ROBERT H. & M. J.	13-T17-13	25.68±
OO	LENZ, PATRICK J.	12-1-46	63.22±
PP	LENZ, PATRICK J.	12-1-14-1	16.13±
QQ	MCNINCH, KENNETH L., ET UX	12-1-14	40.02±
RR	MALARSKI, PETE E., ET UX	12-1-12	24.09±
SS	MILLER, VIOLET D.	12-1-18-1	0.54±
TT	STRICKLIN, ARTHUR W., ET UX	12-1-15-1	0.64±
UU	SMITH, CHESTER L., ET UX	12-1-18-2	0.55±
VV	SHELLHASE, MARK A. & ANDREA	12-1-18-5	0.95±
WW	GIZA, CHESTER A., ET UX	12-1-15	52.18±
XX	GIZA, CHESTER A., ET UX	12-1-16	53.07±

REVISIONS:	COMPANY:	<b>SWN</b> Production Company, LLC	<b>SWN</b> <sup>R+</sup> / <sub>A</sub> <sup>V+</sup> / <sub>+</sub> Production Company™
	OPERATOR'S	BW EDGE MSH	
	WELL #:	5H	
	LOCATION:	SAND HILL DISTRICT, MARSHALL COUNTY, WEST VIRGINIA	
		DATE:	04-07-2017
		DRAWN BY:	W. McCLEAF
		SCALE:	N/A
		DRAWING NO:	087569005
		ADJOINING OWNERS	