

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

API 47-069-00235 County OHIO District LIBERTY
Quad BETHANY Pad Name THELMA HAYS OHI PAD Field/Pool Name PANHANDLE
Farm name SHARON L GARRISON (LIFE ESTATE), TIMOTHY R HAYS & THELMA C HAYS (REMAINDER) Well Number THELMA HAYS OHI 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 4,444,644.692 Easting 537,962.234
Landing Point of Curve Northing 4,444,258.705 Easting 538,440.012
Bottom Hole Northing 4,442,206.049 Easting 539,358.849

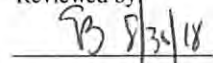
Elevation (ft) 1244.1 GL Type of Well New Existing Type of Report Interim Final
Permit Type Deviated Horizontal Horizontal 6A Vertical Depth Type Deep Shallow
Type of Operation Convert Deepen Drill Plug Back Redrilling Rework Stimulate
Well Type Brine Disposal CBM Gas Oil Secondary Recovery Solution 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 09/15/2017 Date drilling commenced 9/27/2017 Date drilling ceased 11/01/2017
Date completion activities began 03/22/2018 Date completion activities ceased 04/30/2018
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

Freshwater depth(s) ft 427' Open mine(s) (Y/N) depths N
Salt water depth(s) ft 750' Void(s) encountered (Y/N) depths N
Coal depth(s) ft 586' Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

Reviewed
 8/30/18

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Office of Oil and Gas
UN 21 2018
WV Department of
Environmental Protection
Reviewed by:

09/07/2018

API 47-069 - 00235 Farm name SHARON L GARRISON (LIFE ESTATE), TIMOTHY R HAYS & THELMA C HAYS Well number THELMA HAYS OHI 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	26	20	126'	NEW	J-55/94#		Y
Surface	17.5	13.375	636'	NEW	J-55/54.50#	570'	Y, 25 bbls
Coal	SEE SURFACE						
Intermediate 1	12.25	9.625	1851'	NEW	J-55/36#		Y, 30 bbls
Intermediate 2							
Intermediate 3							
Production	8.75/8.50	5.5	15329'	NEW	HCP-110/20#		Y
Tubing		2.375	6792'	NEW	P-110/4.70#		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	346	15.60	1.20	415.2	SURFACE	8
Coal	SEE SURFACE						
Intermediate 1	CLASS A	718	15.60	1.18	847.24	SURFACE	8
Intermediate 2							
Intermediate 3							
Production	CLASS A	2828	15.60	1.18	3337.04	SURFACE	24
Tubing							

Drillers TD (ft) 15329' Loggers TD (ft) 15329' RECEIVED
 Deepest formation penetrated MARCELLUS Plug back to (ft) N/A Office of Oil and Gas
 Plug back procedure N/A JUN 21 2018

Kick off depth (ft) 5950' WV Department of Environmental Protection

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

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 _____

**THELMA HAYS OHI 10H
ATTACHMENT 1
PERF REPORT**

STAGE NUM	Perf Date	Perf Top MD	Perf Bottom MD	# SHOTS PER STG
1	3/22/2018	14,965	15,072	42
2	3/22/2018	14,965	15,072	42
3	3/23/2018	14,825	14,932	42
4	3/23/2018	14,683	14,792	42
5	3/24/2018	14,545	14,652	42
6	3/25/2018	14,405	14,512	42
7	3/26/2018	14,265	14,372	42
8	3/27/2018	14,125	14,232	42
9	3/27/2018	13,985	14,092	42
10	3/28/2018	13,845	13,952	42
11	3/28/2018	13,705	13,805	42
12	3/29/2018	13,565	13,672	42
13	3/30/2018	13,425	13,532	42
14	3/30/2018	13,285	13,392	42
15	3/31/2018	13,145	13,252	42
16	4/1/2018	13,005	13,112	42
17	4/1/2018	12,865	12,972	42
18	4/2/2018	12,725	12,832	42
19	4/2/2018	12,585	12,692	42
20	4/3/2018	12,445	12,552	42
21	4/3/2018	12,305	12,412	42
22	4/5/2018	12,165	12,272	42
23	4/6/2018	12,025	12,132	42
24	4/6/2018	11,885	11,992	42
25	4/7/2018	11,745	11,852	42
26	4/8/2018	11,605	11,712	42
27	4/8/2018	11,465	11,572	42
28	4/10/2018	11,325	11,432	42
29	4/10/2018	11,185	11,292	42
30	4/11/2018	11,045	11,152	42
31	4/11/2018	10,905	11,012	42
32	4/12/2018	10,765	10,872	42
33	4/12/2018	10,625	10,732	42
34	4/12/2018	10,490	10,592	42
35	4/13/2018	10,345	10,452	42
36	4/13/2018	10,205	10,312	42
37	4/13/2018	10,065	10,172	42
38	4/14/2018	9,925	10,031	42
39	4/14/2018	9,785	9,892	42
40	4/15/2018	9,645	9,747	42
41	4/16/2018	9,505	9,612	42
42	4/17/2018	9,365	9,472	33

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THELMA HAYS OHI 10H
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STAGE NUM	Perf Date	Perf Top MD	Perf Bottom MD	# SHOTS PER STG
43	4/18/2018	9,225	9,332	42
44	4/18/2018	9,085	9,192	42
45	4/18/2018	8,945	9,052	42
46	4/19/2018	8,805	8,912	42
47	4/19/2018	8,665	8,772	42
48	4/20/2018	8,525	8,632	42
49	4/20/2018	8,385	8,492	42
50	4/21/2018	8,245	8,352	42
51	4/21/2018	8,105	8,212	42
52	4/21/2018	7,965	8,072	42
53	4/22/2018	7,825	7,932	42
54	4/22/2018	7,684	7,792	42
55	4/23/2018	7,545	7,652	42
56	4/24/2018	7,405	7,512	42
57	4/24/2018	7,265	7,372	42
58	4/25/2018	7,125	7,232	42
59	4/25/2018	6,985	7,092	42
60	4/25/2018	6,845	6,952	42

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**THELMA HAYS OHI 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	3/22/2018	82	8,058	8,555	4,255	496,840	9,094	
2	3/23/2018	83	8,023	8,411	4,636	511,980	8,085	
3	3/23/2018	84	8,045	8,618	4,593	510,960	7,594	
4	3/24/2018	83	8,148	8,682	4,607	511,020	6,904	
5	3/25/2018	80	7,966	8,513	5,012	482,160	7,031	
6	3/26/2018	85	8,303	8,666	4,715	510,540	6,713	
7	3/27/2018	82	8,367	8,755	4,490	513,740	6,795	
8	3/27/2018	84	8,113	8,621	4,899	502,400	6,588	
9	3/28/2018	84	8,026	8,441	4,490	493,380	6,354	
10	3/28/2018	86	8,348	8,677	4,648	499,660	6,265	
11	3/29/2018	79	7,377	8,826	4,331	514,140	6,368	
12	3/30/2018	88	7,811	8,157	4,553	503,560	7,290	
13	3/30/2018	92	7,930	8,493	4,550	496,100	7,182	
14	3/31/2018	83	7,823	8,577	4,559	504,800	6,012	
15	3/31/2018	90	7,749	8,244	4,724	498,720	6,041	
16	4/1/2018	90	7,964	8,635	4,699	502,180	5,899	
17	4/2/2018	93	8,103	8,671	4,528	509,540	5,897	
18	4/2/2018	94	8,088	8,449	4,606	508,060	5,804	
19	4/3/2018	92	8,115	8,562	4,417	506,260	5,723	
20	4/3/2018	96	8,309	8,641	4,738	506,060	5,906	
21	4/4/2018	99	8,184	8,644	4,503	493,800	5,929	
22	4/5/2018	93	7,834	8,725	4,373	507,880	6,132	
23	4/6/2018	95	7,824	8,290	4,897	507,300	6,270	
24	4/7/2018	98	7,928	8,545	4,434	506,600	5,927	
25	4/8/2018	100	7,999	8,533	4,605	499,800	5,942	RECEIVED
26	4/8/2018	99	8,046	8,339	4,353	507,100	5,838	Office of Oil and Gas
27	4/9/2018	88	7,193	7,817	4,452	505,600	5,868	JUN 21 2018
28	4/10/2018	89	7,602	8,831	4,936	513,560	5,706	
29	4/11/2018	91	7,520	7,999	4,496	508,780	5,672	MA Department of Environmental Protection
30	4/11/2018	92	7,723	8,293	4,572	508,220	5,762	
31	4/11/2018	100	7,927	8,513	4,665	502,620	5,602	
32	4/12/2018	98	7,653	8,044	4,585	508,080	5,594	
33	4/12/2018	97	7,493	8,151	4,367	507,510	5,846	
34	4/12/2018	99	7,785	8,753	4,430	500,200	5,786	
35	4/13/2018	98	7,683	8,201	4,962	498,920	6,212	
36	4/13/2018	98	7,265	8,127	4,709	503,300	5,666	
37	4/14/2018	98	7,811	8,400	4,626	488,010	5,505	
38	4/14/2018	101	7,363	7,822	4,337	510,400	5,452	
39	4/15/2018	94	7,437	8,001	4,532	509,480	5,555	
40	4/16/2018	92	7,001	7,535	4,215	496,620	5,686	
41	4/17/2018	100	7,389	7,751	4,481	501,700	5,409	
42	4/17/2018	99	8,003	8,447	4,398	498,580	5,542	
43	4/18/2018	100	7,615	8,037	4,752	498,000	5,261	
44	4/18/2018	96	7,268	8,981	4,515	507,420	5,284	
45	4/19/2018	95	7,394	7,991	4,777	506,420	5,826	
46	4/19/2018	100	7,495	8,054	4,392	508,780	5,784	
47	4/19/2018	97	7,335	8,364	4,421	507,720	5,327	
48	4/20/2018	91	7,093	7,536	4,610	499,080	5,495	
49	4/20/2018	96	7,149	7,579	4,405	498,740	5,656	
50	4/21/2018	96	7,298	7,562	4,592	502,100	5,411	
51	4/21/2018	100	7,553	7,948	4,535	495,180	5,127	
52	4/22/2018	97	7,438	8,736	5,187	506,420	5,271	
53	4/22/2018	91	6,842	7,643	4,669	504,040	5,561	

09/07/2018

THELMA HAYS OHI 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
54	4/23/2018	100	7,327	7,849	4,386	514,240	5,362	
55	4/23/2018	96	6,680	7,105	4,939	504,960	5,413	
56	4/24/2018	100	6,800	7,266	4,292	501,240	5,365	
57	4/25/2018	99	7,104	7,605	4,461	501,200	5,111	
58	4/25/2018	95	6,499	8,286	4,130	497,720	5,075	
59	4/25/2018	100	6,664	7,930	4,522	497,360	5,068	
60	4/25/2018	100	6,700	7,270	4,611	511,040	5,126	

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Well Name: THELMA HAYS OHI 10H

47069002350000

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	427.00	427.00	
Top of Salt Water	750.00	750.00	NA	NA	
Pittsburgh Coal	586.00	586.00	593.00	593.00	
Pottsville (ss)	734.00	734.00	845.00	845.00	
Mauch Chunk (shale)	846.00	846.00	1620.00	1620.00	
Raven Cliff (ss)	1152.00	1152.00	1313.00	1313.00	
Maxton (ss)	1463.00	1463.00	1620.00	1620.00	
Greenbriar (ls)	1620.00	1620.00	1782.00	1782.00	
Big Injun (ss)	1788.00	1782.00	1935.00	1929.00	
Berea (siltstone)	2287.00	2281.00	5907.00	5780.00	
Rhinstreet (shale)	5907.00	5780.00	6204.00	6062.00	
Cashaqua (shale)	6204.00	6062.00	6263.00	6114.00	
Middlesex (shale)	6263.00	6114.00	6364.00	6193.00	
Burket (shale)	6364.00	6193.00	6389.00	6210.00	
Tully (ls)	6389.00	6210.00	6449.00	6250.00	
Mahantango (shale)	6449.00	6250.00	6825.00	6387.00	
Marcellus (shale)	6825.00	6387.00	NA	NA	GAS

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	3/22/2018
Job End Date:	4/26/2018
State:	West Virginia
County:	Ohio
API Number:	47-069-00235-00-00
Operator Name:	Southwestern Energy
Well Name and Number:	THELMA HAYS OHI 10H
Latitude:	40.15129300
Longitude:	-80.55428300
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,462
Total Base Water Volume (gal):	14,813,122
Total Base Non Water Volume:	0



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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
Fresh Water	Operator	Base Fluid					
			Water	7732-18-5	100.00000	79.41912	Density = 8.340
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	1.02813	

THRASHER

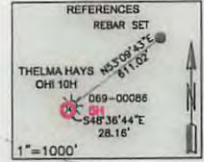
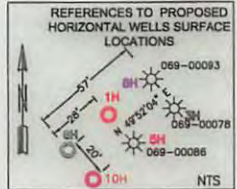
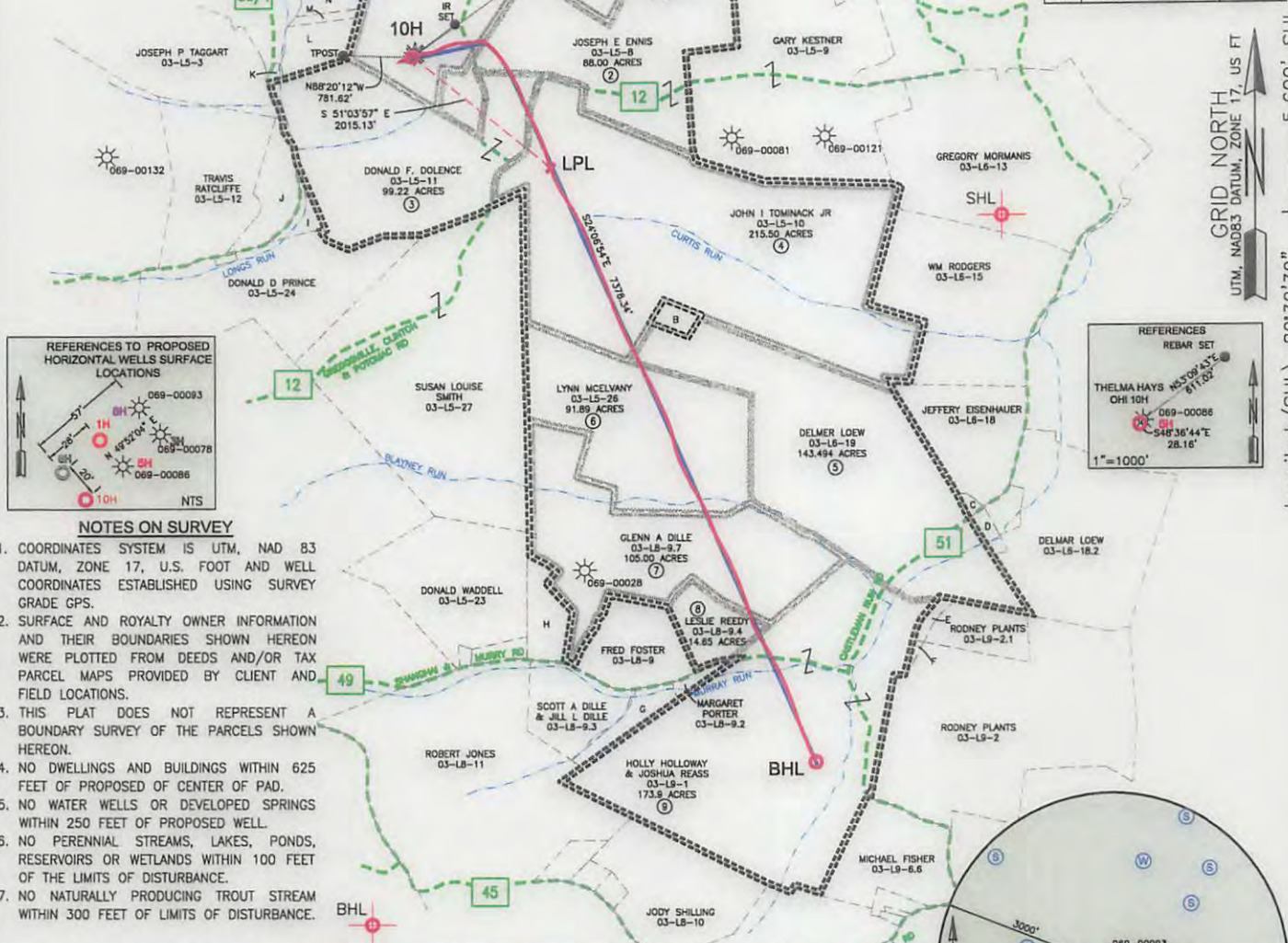
THE THRASHER GROUP, INC.
600 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE 304-624-4108

10,635' BHL

Latitude: 40°10'00"

3,513' SHL

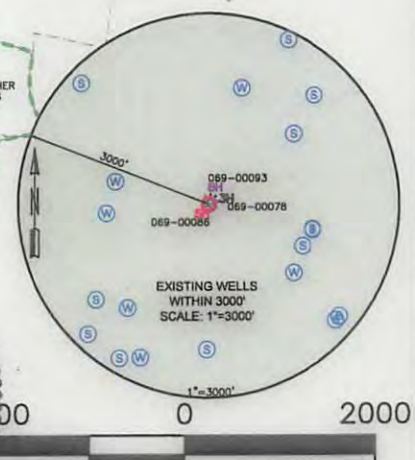
TRACT	ADJOINER	TAX PARCEL
A	JASON T & SHEENA R HAYES	03-12-12.2
B	TUNNELL RIDGE LLC	03-18-22
C	DELMAR LOEW	03-16-18.1
D	DONNA MUSILLI	03-16-18.3
E	RODNEY PLANTS	03-19-2.2
F	RODNEY PLANTS	03-19-2.3
G	GEORGE E PORTER III	03-18-9.5
H	NEAL P BROWN	03-18-9.6
I	JOSEPH O PRINCE	03-15-11.2
J	TRAVIS C RATCLIFFE	03-15-12.1
K	GENE MONROE	03-15-7.3
L	JOSH P & SHIRLEY J TAGGART	03-15-7.1
M	GEORGE W GROVE JR	03-15-7.4
N	CHARLES W GROUNDS	03-15-4



- 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.

SURFACE HOLE LOCATION (SHL):	SURFACE HOLE LOCATION (SHL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,444,644.692 EASTING: 537,962.234	UTM (NAD83, ZONE 17, METERS): NORTHING: 4,444,644.692 EASTING: 537,962.234
LANDING POINT LOCATION (LPL):	LANDING POINT LOCATION (LPL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,444,549.948 EASTING: 538,316.937	UTM (NAD83, ZONE 17, METERS): NORTHING: 4,444,258.705 EASTING: 538,440.012
BOTTOM HOLE LOCATION (BHL):	BOTTOM HOLE LOCATION (BHL):
UTM (NAD83, ZONE 17, METERS): NORTHING: 4,442,196.890 EASTING: 539,362.915	UTM (NAD83, ZONE 17, METERS): NORTHING: 4,442,206.049 EASTING: 539,358.849

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 *M.S.W. 5/22/18* 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 #: THELMA HAYS OHI 10H API WELL #: 47 069 00235 STATE COUNTY PERMIT
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WELL TYPE: OIL WASTE DISPOSAL PRODUCTION DEEP GAS LIQUID INJECTION STORAGE SHALLOW

WATERSHED: BUFFALO CREEK ELEVATION: 1244.1'

DISTRICT: LIBERTY COUNTY: OHIO QUADRANGLE: BETHANY

SURFACE OWNER: SHARON L GARRISON(LIFE ESTATE), TIMOTHY R HAYS, AND THELMA C HAYS(REMAINDER) ACREAGE: ± 102.00

OIL & GAS ROYALTY OWNER: TIMOTHY R HAYS, THELMA C HAYS, AND SHARON L GARRISON ACREAGE: ± 102.00

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: 6,462' TDV 15,329' TDV

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:	REVISIONS:	DATE:
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 TPL* TURNING POINT LOCATION	05-16-2018 DRAWN BY: K. POTH SCALE: 1" = 2000' DRAWING NO: 050-5660 WELL LOCATION PLAT