

09/28/2018



west virginia department of environmental protection

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

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Friday, September 28, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

SWN PRODUCTION COMPANY, LLC
POST OFFICE BOX 12359

SPRING, TX 773914954

Re: Permit Modification Approval for STATE OF WV DNR B BRK 6H
47-009-00247-00-00

Decreased TVD due to removing pilot hole potential

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.

A handwritten signature in blue ink, appearing to read 'James A. Martin', is written over a light blue circular stamp. Below the signature, the name 'James A. Martin' and the title 'Chief' are printed in black text.

James A. Martin
Chief

Operator's Well Number: STATE OF WV DNR B BRK 6H
Farm Name: STATE OF WEST VIRGINIA, BUREAU OF COMME
U.S. WELL NUMBER: 47-009-00247-00-00
Horizontal 6A New Drill
Date Modification Issued: September 28, 2018

Promoting a healthy environment.

September 7, 2018

Ms. Laura Adkins
Office of Oil & Gas
601 57th Street
Charleston, WV 25304

Issue

RE: Modification: State of WV DNR B BRK 6H

Dear Ms. Adkins

Enclosed please find the updated 6B, WBD, and Mylar for the above captioned well. We have removed the pilot hole from this well. This well is situated on the WV DNR's property, in Brooke County, West Virginia.

If you have any questions or desire additional information, please me at 304-884-1613.

Thank you.

Sincerely,

Brittany Woody

Brittany Woody
Regulatory Analyst
Southwestern Energy Production Company, LLC

*Check coordinates
in RBDMS*

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SEP 10 2018

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

1) Well Operator: SWN Production Co., LLC 494512924 009-Brooke 4- Cross 620- Steubenville
Operator ID County District Quadrangle

2) Operator's Well Number: State of WV DNR B BRK 6H Well Pad Name: State of WV DNR B BRK Pad

3) Farm Name/Surface Owner: State of WV Bureau of Commerce- DNR Public Land Company Public Road Access: Tent Church Road

4) Elevation, current ground: 1201' Elevation, proposed post-construction: 1201'

5) Well Type (a) Gas Oil _____ Underground Storage _____
Other _____

(b) If Gas Shallow Deep _____
Horizontal _____

6) Existing Pad: Yes or No Yes *E-156 9.7.18*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Target Formation- Marcellus, Down-Dip Well to the South, Target Top TVD- 5734', Target Base TVD- 5775', Anticipated Thickness- 43', Associated Pressure- 3752

8) Proposed Total Vertical Depth: 5762'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 12503'

11) Proposed Horizontal Leg Length: 6434.92'

12) Approximate Fresh Water Strata Depths: 543'

13) Method to Determine Fresh Water Depths: Salinity Profile deeper than nearby water well at <300

14) Approximate Saltwater Depths: 693' Salinity Profile at top of high salinity sandstone

15) Approximate Coal Seam Depths: 135'

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

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes _____ No

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

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19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill and stimulate any potential zones between and including the Benson to Marcellus. **If we should encounter a void place basket above and below void area- balance cement to bottom of void and grout from basket to surface or run external casing packer/cementing stage tool above void interval and perform 2 stage cementing operation dependent upon depth of void. Run casing not less than 20' below void nor more than 75' below void. (*If freshwater is encountered deeper than anticipated it must be protected, set casing 50' below and cts.)

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Well will be perforated within the target formation and stimulated with a slurry of water, sand, and chemical additives at a high rate. This will be performed in stages with the plug and perf method along the wellbore until the entire lateral has been stimulated within the target formation. All stage plugs are then drilled out and the well is flowed back to surface. The well is produced through surface facilities consisting of high pressure production unites, horizontal separation units, water and oil storage tanks. Max press and anticipated max rate- 9000 lbs @ 100 barrels a minute.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 13.50

22) Area to be disturbed for well pad only, less access road (acres): 9.31

23) Describe centralizer placement for each casing string:

All casing strings will be ran with a centralizer at a minimum of 1 per every 3 joints of casing.

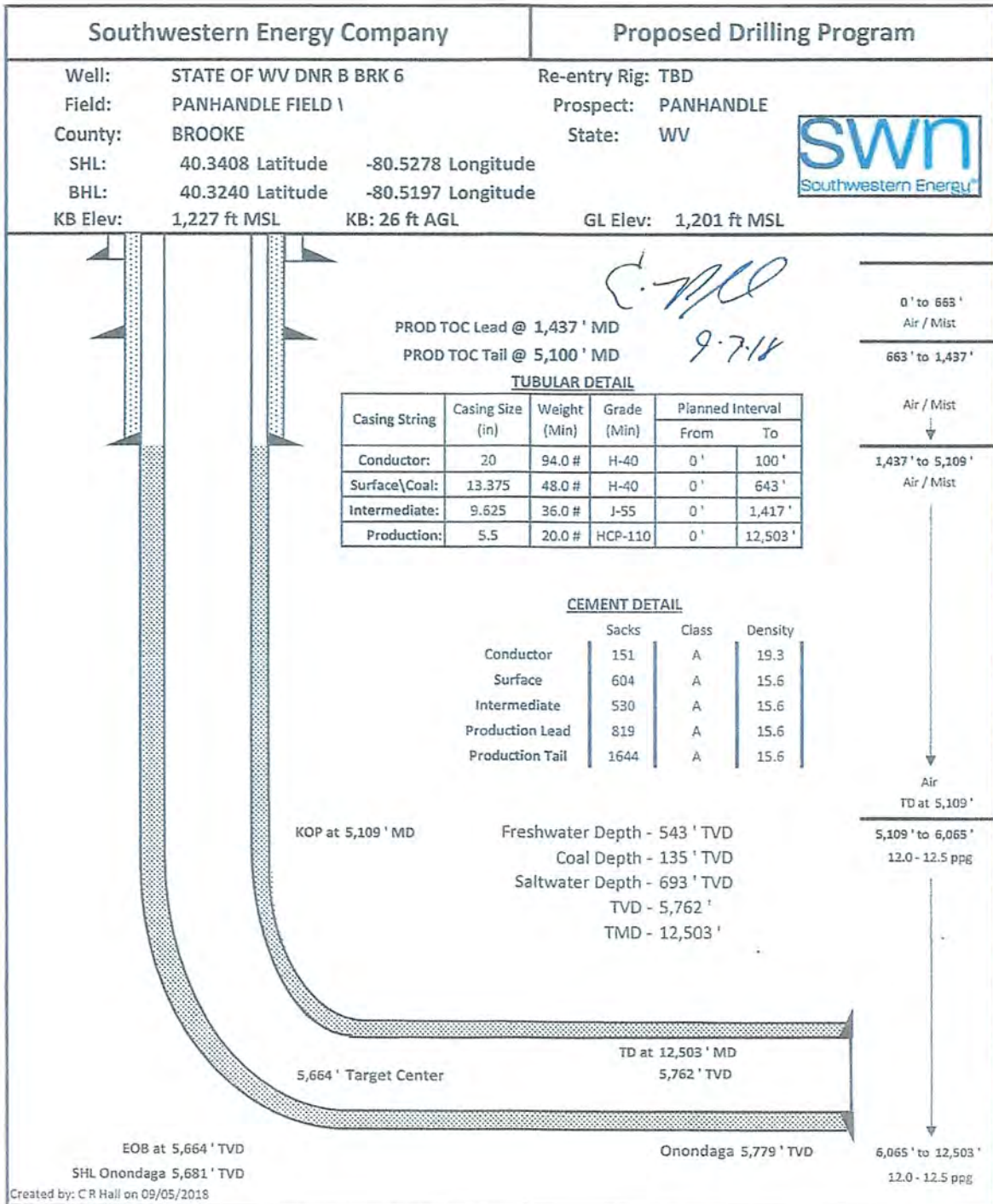
24) Describe all cement additives associated with each cement type:

See Attachment ***

25) Proposed borehole conditioning procedures:

All boreholes will be conditioned with circulation and rotation for a minimum of one bottoms up and continuing until operator is satisfied with borehole conditions.

*Note: Attach additional sheets as needed.



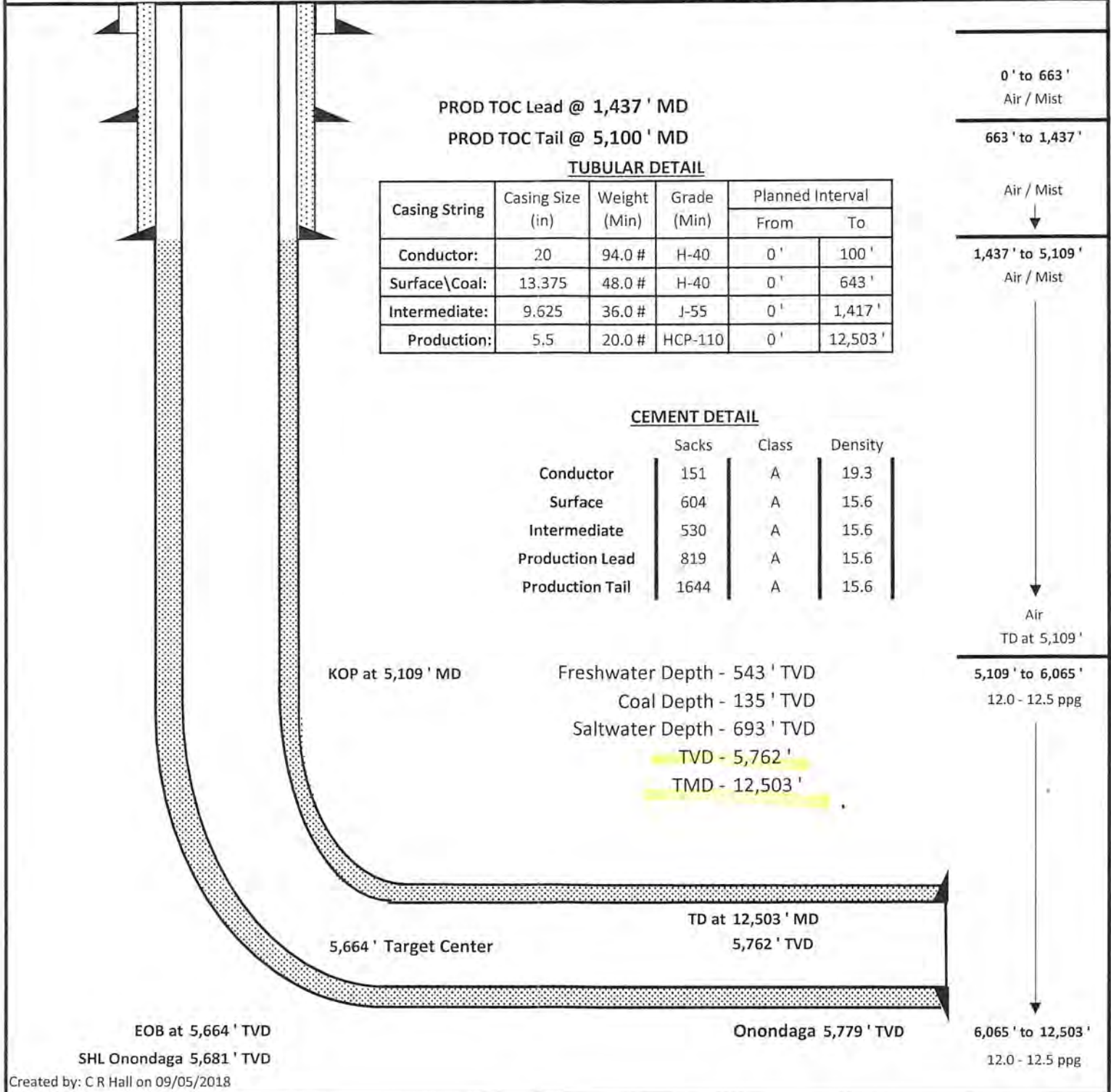
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Southwestern Energy Company		Proposed Drilling Program	
Well:	STATE OF WV DNR B BRK 6	Re-entry Rig:	TBD
Field:	PANHANDLE FIELD \	Prospect:	PANHANDLE
County:	BROOKE	State:	WV
SHL:	40.3408 Latitude	-80.5278 Longitude	
BHL:	40.3240 Latitude	-80.5197 Longitude	
KB Elev:	1,227 ft MSL	KB: 26 ft AGL	GL Elev: 1,201 ft MSL



PROD TOC Lead @ 1,437' MD
 PROD TOC Tail @ 5,100' MD

TUBULAR DETAIL

Casing String	Casing Size (in)	Weight (Min)	Grade (Min)	Planned Interval	
				From	To
Conductor:	20	94.0 #	H-40	0'	100'
Surface\Coal:	13.375	48.0 #	H-40	0'	643'
Intermediate:	9.625	36.0 #	J-55	0'	1,417'
Production:	5.5	20.0 #	HCP-110	0'	12,503'

CEMENT DETAIL

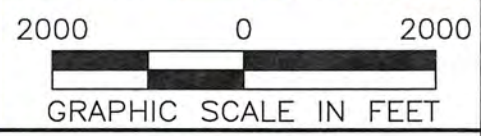
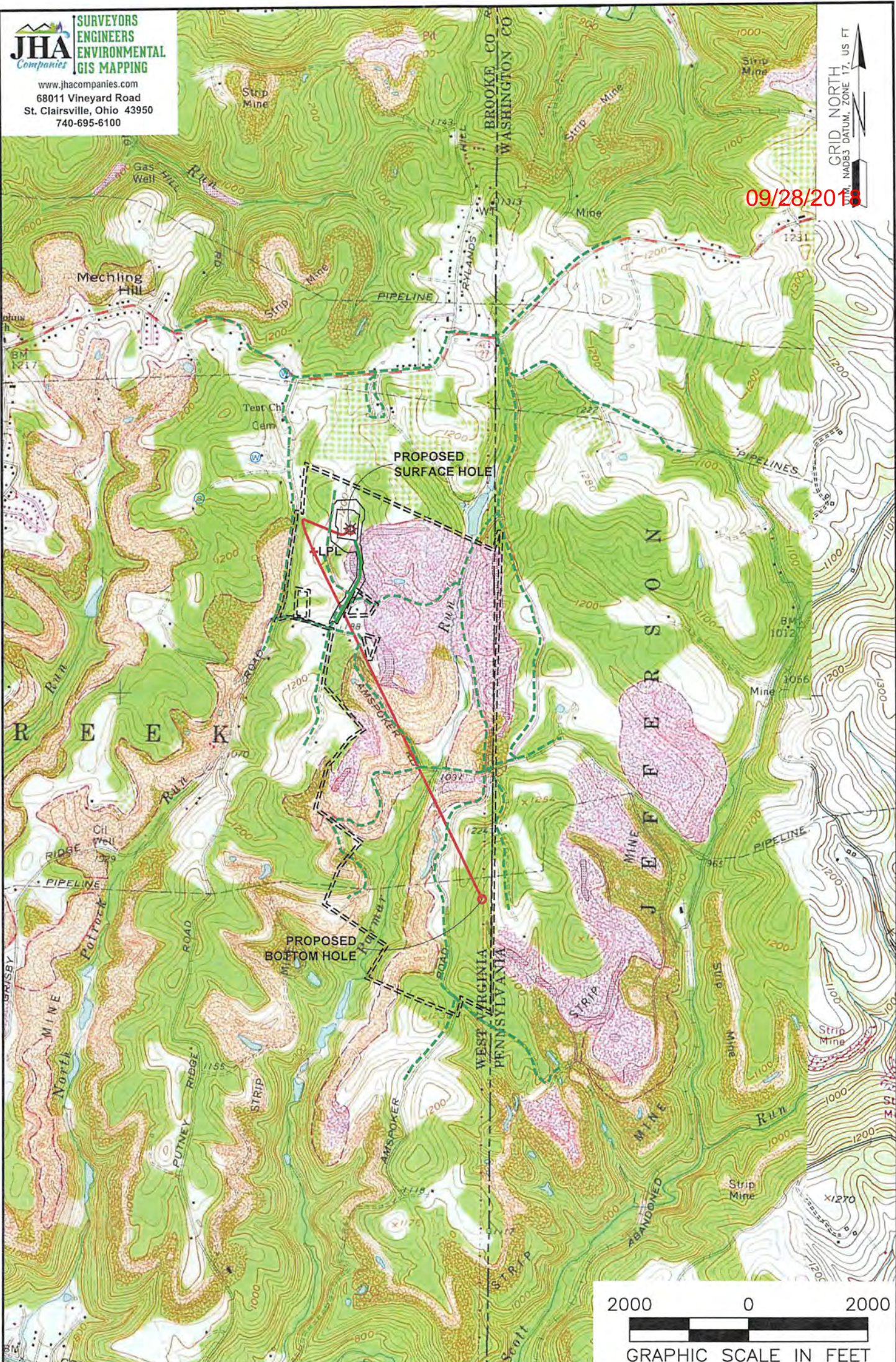
	Sacks	Class	Density
Conductor	151	A	19.3
Surface	604	A	15.6
Intermediate	530	A	15.6
Production Lead	819	A	15.6
Production Tail	1644	A	15.6

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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 PLAIN
- ACCESS ROAD
- PUBLIC ROAD
- ACCESS ROAD TO PREV. SITE
- LEASE BOUNDARY
- PROPOSED PATH

9-00247 M00

WELL OPERATOR: SWN PRODUCTION COMPANY, LLC	WELL (FARM) NAME: STATE OF WV DNR B	WELL # 6H	SERIAL # XXXX
ADDRESS: P.O. BOX 1300 JANE LEW, WV 26378	COUNTY - CODE BROOKE - 009	DISTRICT: CROSS CREEK	
SURFACE OWNER: STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DNR	USGS 7 1/2 QUADRANGLE MAP NAME: STUEBENVILLE EAST		

Latitude: 40°22'30" SURFACE HOLE

7717'

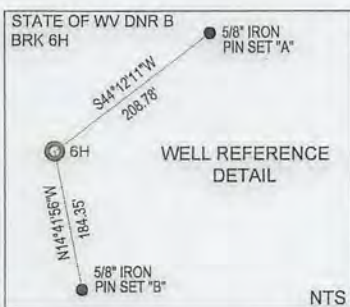
Latitude: 40°20'00" BOTTOM HOLE

5457'



www.jhacompanies.com

68011 Vineyard Road
St. Clairsville, Ohio 43950
740-695-6100



LINE	BEARING	DISTANCE
L1	S05°40'24"W	718.39'
L2	S34°07'28"E	1292.70'

SURFACE HOLE LOCATION (SHL): UTM (NAD83, ZONE 17, METERS): NORTHING: 4465690.92 EASTING: 540108.90
LANDING POINT LOCATION (LPL): UTM (NAD83, ZONE 17, METERS): NORTHING: 4465576.03 EASTING: 539923.05
BOTTOM HOLE LOCATION (BHL): UTM (NAD83, ZONE 17, METERS): NORTHING: 4463825.74 EASTING: 540808.17

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. 2041



(+) 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 ELEVATION: GRADE GPS (NAVD 88, US FT)

STATE OF WV DNR B BRK
OPERATOR'S WELL #: 6H
API WELL #: 47 009 DD247MOD
STATE COUNTY PERMIT

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

WATERSHED: UPPER OHIO NORTH ELEVATION: 1201.0'

DISTRICT: CROSS CREEK COUNTY: BROOKE QUADRANGLE: STEUBENVILLE EAST, OH

SURFACE OWNER: STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DNR ACREAGE: ±169.43

OIL & GAS ROYALTY OWNER: STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DNR ACREAGE: ±169.43

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

CONVERT PLUG & ABANDON CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY)

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: 5,762' TVD 12,502.7' TMD

WELL OPERATOR: SWN PRODUCTION COMPANY, LLC DESIGNATED AGENT: BRITTANY WOODY

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

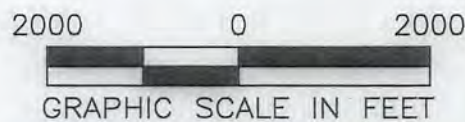
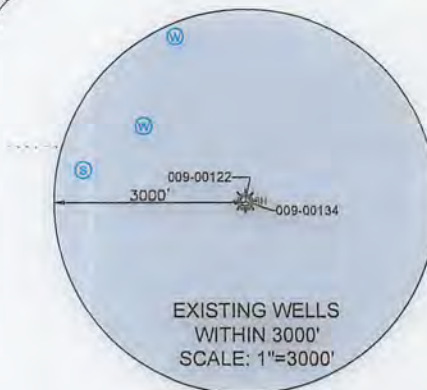
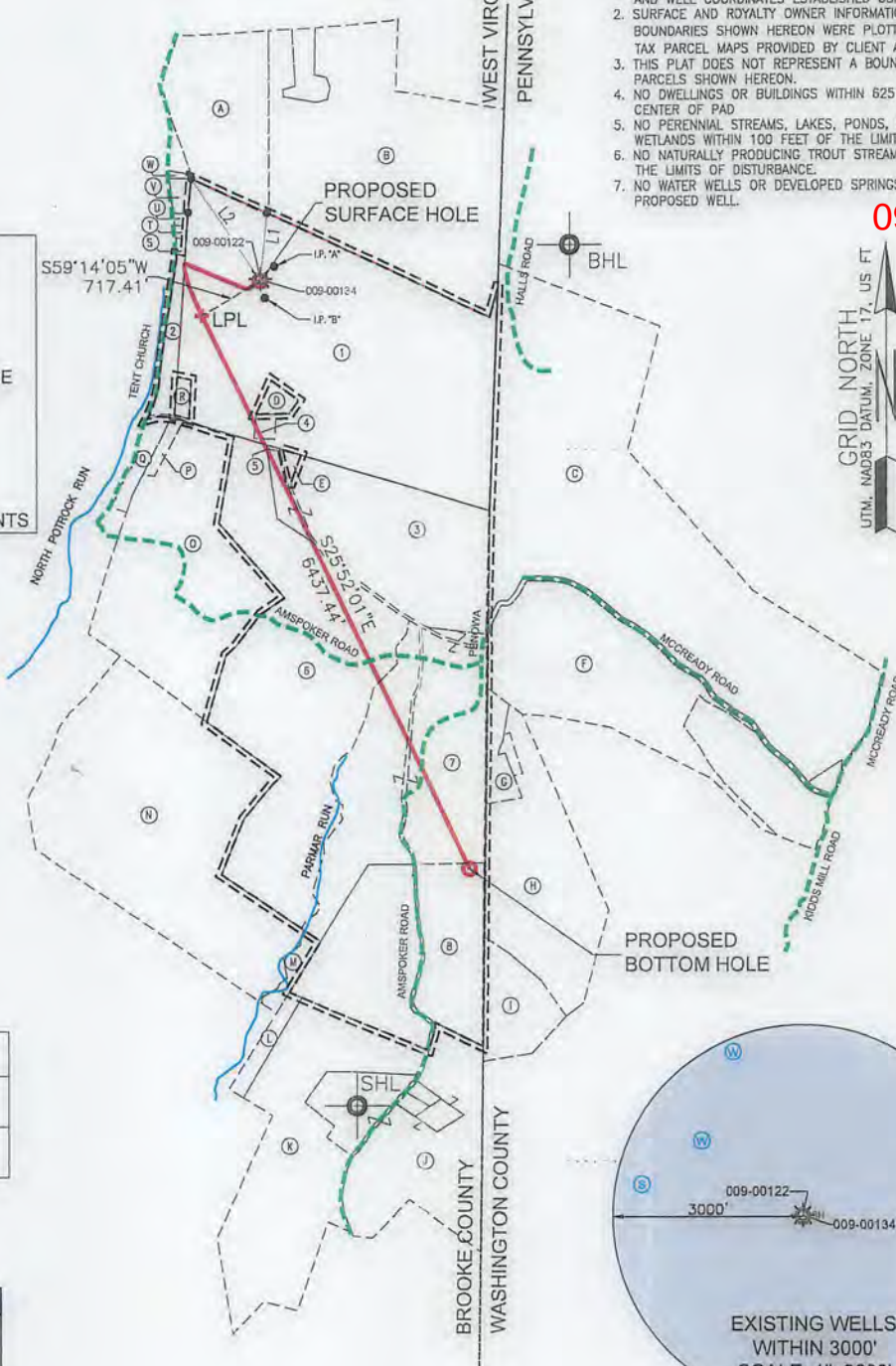
CITY: JANE LEW STATE: WV ZIP CODE: 26378 CITY: JANE LEW STATE: WV ZIP CODE: 26378

LEGEND:	REVISIONS:	DATE:
○ PROPOSED SURFACE HOLE / BOTTOM HOLE	— SURVEYED BOUNDARY	09-12-2018
⊙ EXISTING / PRODUCING WELLHEAD	— DRILLING UNIT	
LPL* LANDING POINT LOCATION	--- LEASE BOUNDARY	DRAWN BY: D. REED
⊙ EXISTING WATER WELL	— PROPOSED PATH	SCALE: 1" = 2000'
⊙ EXISTING SPRING		DRAWING NO: 2017-541
		WELL LOCATION PLAT

NOTES ON SURVEY

- COORDINATE 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/OR FIELD LOCATIONS.
- THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARCELS SHOWN HEREON.
- NO DWELLINGS OR BUILDINGS WITHIN 625 FEET OF PROPOSED CENTER OF PAD
- 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 THE LIMITS OF DISTURBANCE.
- NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF PROPOSED WELL.

09/28/2018





Longitude: -80°30'00" SURFACE HOLE

Longitude: -80°30'00" BOTTOM HOLE

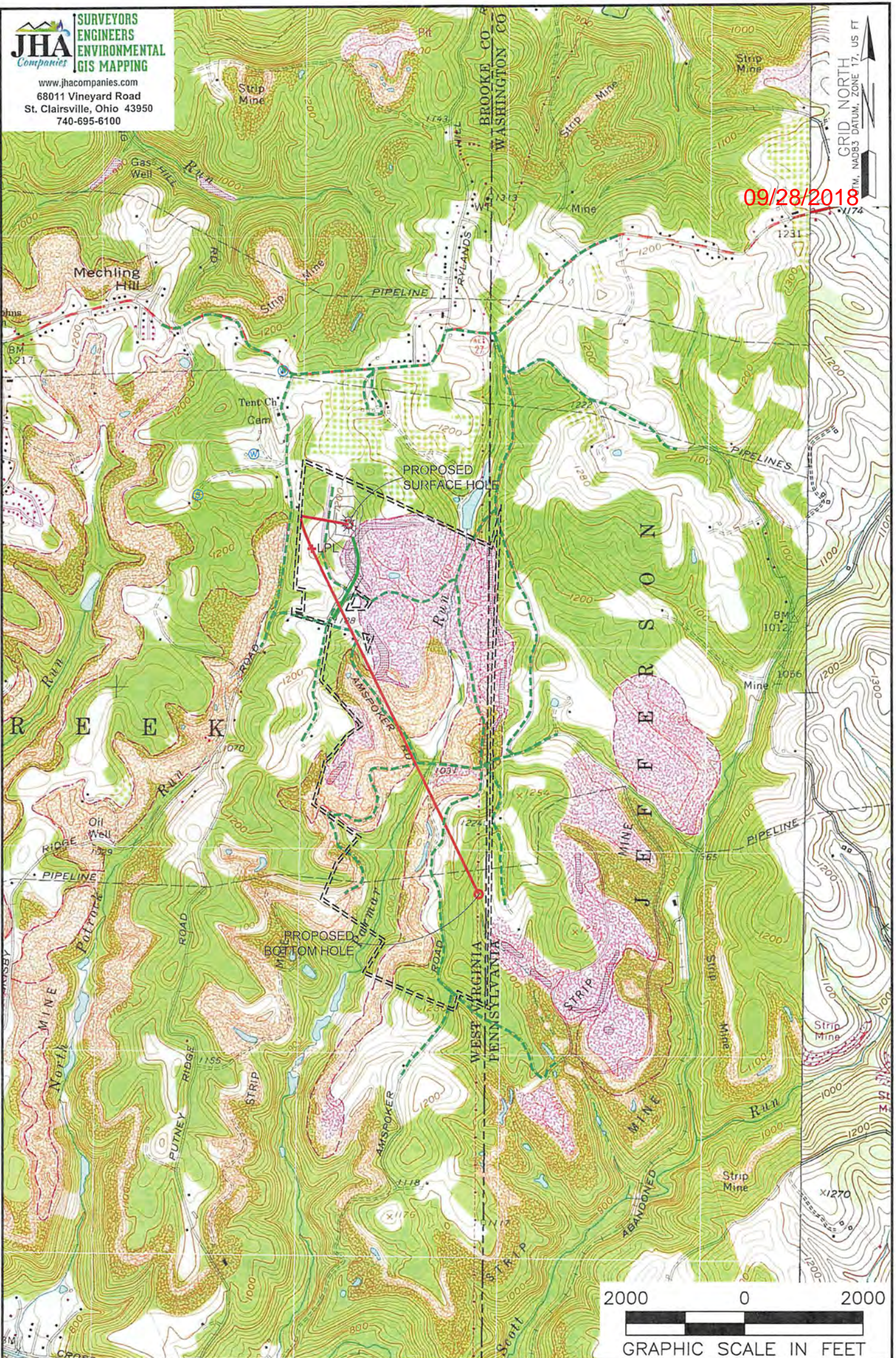
WELL BORE TABLE FOR SURFACE / ROYALTY OWNERS			
TRACT	SURFACE OWNER (S) / ROYALTY OWNER (R)	TAX PARCEL	ACRES
1	STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DIVISION OF NATURAL RESOURCES, PUBLIC LAND CORPORATION FOR THE USE AND BENEFIT OF THE WILDLIFE RESOURCES SECTION (S/R)	4-CC16-019.00	1.0647
09/28/2018			
TRACT	SURFACE OWNER	TAX PARCEL	ACRES
2	DANNY D. TICE & MARCIA TICE	4-CC16-016.00	6.24
3	STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DIVISION OF NATURAL RESOURCES, PUBLIC LAND CORPORATION FOR THE USE AND BENEFIT OF THE WILDLIFE RESOURCES SECTION	4-CC16-022.00	74.032
4	STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DIVISION OF NATURAL RESOURCES, PUBLIC LAND CORPORATION FOR THE USE AND BENEFIT OF THE WILDLIFE RESOURCES SECTION	4-CC16-017.00	1.19
5	STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DIVISION OF NATURAL RESOURCES, PUBLIC LAND CORPORATION FOR THE USE AND BENEFIT OF THE WILDLIFE RESOURCES SECTION	4-CC16-021.00	0.19
6	STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DIVISION OF NATURAL RESOURCES, PUBLIC LAND CORPORATION FOR THE USE AND BENEFIT OF THE WILDLIFE RESOURCES SECTION	4-CC16-023.01	117.720
7	STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DIVISION OF NATURAL RESOURCES, PUBLIC LAND CORPORATION FOR THE USE AND BENEFIT OF THE WILDLIFE RESOURCES SECTION	4-CC16-023.00	80.100
8	STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DIVISION OF NATURAL RESOURCES, PUBLIC LAND CORPORATION FOR THE USE AND BENEFIT OF THE WILDLIFE RESOURCES SECTION	4-CC16-024.00	74.000

ADJOINING OWNERS TABLE			
TRACT	SURFACE OWNER	TAX PARCEL	ACRES
A	MARGARET FRESHWATER	04-C12K-0080.0000	36.01
B	DEBORAH JANE HAMILTON	04-C12K-0078.0000	109.82
C	ARTHUR C. MCDERMITT, JR.	380-008-00-00-0007-01	209.46
D	WEST VIRGINIA ST OF BUREAU OF COMM DIV OF NAT RES PB LD CORP	04-CC16-0018.000	2.16
E	WEST VIRGINIA ST OF BUREAU OF COMM DIV OF NAT RES PB LD CORP	04-CC16-0020.0000	1.81
F	ARTHUR C. MCDERMITT, JR.	380-008-00-00-0007-03	61.417
G	PENNWEIR CONSTRUCTION CO.	380-014-00-00-0009-00	6.5
H	PENNWEIR CONSTRUCTION CO.	380-014-00-00-0008-00	61.0
I	PENNWEIR CONSTRUCTION CO.	380-014-00-00-0007-00	16.0
J	ST OF WV DEPT OF COMMERCE NAT RESOURCES	04-CC20-0030.0000	59.12
K	ST OF WV DEPT OF COMMERCE NAT RESOURCES	04-CC20-0027.0000	71.687
L	ST OF WV DEPT OF COMMERCE NAT RESOURCES	04-CC20-0026.0000	3.90
M	ST OF WV DEPT OF COMMERCE NAT RESOURCES	04-CC20-0046.0000	2.90
N	STATE OF WV BUREAU COMM-DIV NR PUBLIC LAND CORP	04-CC16-0008.0001	123.30
O	WEST VIRGINIA ST OF BUREAU DIV OF COMM DIV OF NAT RES PB LD	04-CC16-0011.0000	77.88
P	DONNA K. ROSS (1/2) & WILLIAM J PAULES (1/2)	04-CC16-0014.0000	2.00
Q	DENNIS, SR. & DENNIS, JR. MOLNAR	04-CC16-0013.0000	6.50
R	TIMOTHY BRIAN CUNNINGHAM	04-CC16-0015.0000	1.22
S	DAVID A. & GERALDINE DODD	04-CC12-0041.0000	0.47
T	JOHN D. & KAREN DUFFIELD	04-CC12-0040.0000	0.417
U	JOHN D. & KAREN DUFFIELD	04-CC12-0039.0000	0.486
V	LARRY G., SR. & NORA LOU DODD	04-CC12-0038.0000	1.73
W	RITA K. THOMAS	04-CC12-0055.0000	10.50

9-00247 MOD

REVISIONS:	COMPANY:	 	
	OPERATOR'S	STATE OF WV DNR B BRK	
	WELL #:	6H	
	DISTRICT:	COUNTY:	STATE:
	CROSS CREEK	BROOKE	WV
		DATE:	09-12-2018
		DRAWN BY:	D. REED
		SCALE:	N/A
		DRAWING NO:	2017-541
		WELL LOCATION PLAT	

09/28/2018



NOTES ON SURVEY

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LEGEND:

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- EXISTING / PRODUCING WELLHEAD
- LANDING POINT LOCATION
- FLOOD PLAIN
- ACCESS ROAD
- PUBLIC ROAD
- ACCESS ROAD TO PREV. SITE
- LEASE BOUNDARY
- PROPOSED PATH

WELL OPERATOR:
 SWN PRODUCTION COMPANY, LLC

ADDRESS:
 P.O. BOX 1300 JANE LEW, WV 26378

SURFACE OWNER:
 STATE OF WEST VIRGINIA, BUREAU OF COMMERCE, DNR

WELL (FARM) NAME:
 STATE OF WV DNR B

COUNTY - CODE
 BROOKE - 009

USGS 7 1/2 QUADRANGLE MAP NAME:
 STEUBENVILLE EAST, OH

WELL # SERIAL #
 6H XXXX

DISTRICT:
 CROSS CREEK