



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

Thursday, June 14, 2018
WELL WORK PERMIT
Horizontal 6A / New Drill

TUG HILL OPERATING, LLC
380 SOUTHPOINTE BOULEVARD, PLAZA II
SUITE 200
CANNONSBURG, PA 15317

Re: Permit approval for WELLER 7HM
47-051-02039-00-00

This well work permit is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to any additional specific conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas Inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days of completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless 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: WELLER 7HM
Farm Name: ULA F. NELSON
U.S. WELL NUMBER: 47-051-02039-00-00
Horizontal 6A New Drill
Date Issued: 6/14/2018

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than one hundred (100) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. 24 hours prior to the initiation of the completion process the operator shall notify the Chief or his designee.
8. During the completion process the operator shall monitor annular pressures and report any anomaly noticed to the chief or his designee immediately.
9. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
10. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

PERMIT CONDITIONS

11. The operator shall provide to the Office of Oil and Gas the dates of each of the following within 30 days of their occurrence: completion of construction of the well pad, commencement of drilling, cessation of drilling, completion of any other permitted well work, and completion of the well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov.

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

1) Well Operator: Tug Hill Operating, LLC

<u>494510851</u>	<u>Marshall</u>	<u>Franklin</u>	<u>New Martinsville 7</u>
Operator ID	County	District	Quadrangle

2) Operator's Well Number: Weller 7HM Well Pad Name: Lily

3) Farm Name/Surface Owner: Ula F. Nelson Public Road Access: Route 2/2

4) Elevation, current ground: 1273' Elevation, proposed post-construction: 1273'

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

(b) If Gas Shallow Deep _____
Horizontal

6) Existing Pad: Yes or No Yes

JN 6/13/18

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus is the target formation at a depth of 6464' - 6517', thickness of 53' and an anticipated approx. pressure of 3800 psi.

8) Proposed Total Vertical Depth: 6617'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 14,304'

11) Proposed Horizontal Leg Length: 7,314'

12) Approximate Fresh Water Strata Depths: 70', 871'

13) Method to Determine Fresh Water Depths: Use shallow offset wells to determine deepest freshwater Or determine using predrill tests, testing while drilling or petrophysical evaluation of resistivity

14) Approximate Saltwater Depths: 1,740'

15) Approximate Coal Seam Depths: Sewickley Coal - 778' and Pittsburgh Coal - 866'

16) Approximate Depth to Possible Void (coal mine, karst, other): None

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: _____

18)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<u>Size (in)</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling (ft)</u>	<u>INTERVALS: Left in Well (ft)</u>	<u>CEMENT: Fill-up (Cu. Ft.)/CTS</u>
Conductor	30"	NEW	BW	BW	120'	120'	216ft^3(CTS)
Fresh Water	13 3/8"	NEW	J55	54.5#	971'	971'	966ft^3(CTS)
Coal	13 3/8"	NEW	J55	54.5#	971'	971'	966ft^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#	2611'	2611'	866ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	14,304'	14,304'	3658ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#	6,742'		
Liners							

JW 6/13/18

<u>TYPE</u>	<u>Size (in)</u>	<u>Wellbore Diameter (in)</u>	<u>Wall Thickness (in)</u>	<u>Burst Pressure (psi)</u>	<u>Anticipated Max. Internal Pressure (psi)</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
Conductor	30"	36"	1.0	2,333	1,866	CLASS A	1.2
Fresh Water	13 3/8"	17.5"	.33	2,740	2,192	SEE#24	1.2
Coal	13 3/8"	17.5"	.33	2,740	2,192	SEE #24	1.2
Intermediate	9 5/8"	12 1/4"	.352	3,520	2,816	SEE #24	1.19
Production	5 1/2"	8 7/8_ 8 3/4	.361	12,640	10,112	SEE #24	1.17/1.19
Tubing	2 3/8"		.19	11,200	8,960		
Liners							

PACKERS

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

JN 6/13/18

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

Drill through the Marcellus tagging less than 100' from the top of the Onondata to get depths and log data. Plug back to proposed kick off point. Drill the horizontal section to planned and proposed TD. Run casing and cement to surface. Run Bond Log from app. 60 deg to surface. Make clean out run and stimulate.

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

Well to be completed with approximately 18,285,000 lb. proppant and 282,699 barrels of water. Max rate = 80bpm; max psi = 9,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 11.08 acres

22) Area to be disturbed for well pad only, less access road (acres): 4.96 acres

23) Describe centralizer placement for each casing string:

Will run 3 centralizers on surface casing at equal distance. Intermediate will have 1 centralizer every other joint. Production casing will have one centralizer every other joint in lateral, one centralizer every joint through curve, one centralizer every other joint to surface.

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

*See attachment

25) Proposed borehole conditioning procedures:

Will circulate a minimum of 3 hours at TD, short trip to curve, circulate bottoms up, check for flow, POOH.

*Note: Attach additional sheets as needed.



Tug Hill Operating, LLC Casing and Cement Program

Weller-7HM

Casing

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	100'	CTS
Surface	13 3/8"	J55	17 1/2"	971'	CTS
Intermediate	9 5/8"	J55	12 1/4"	2,611'	CTS
Production	5 1/2"	CYHP110	8 7/8 x 8 3/4"	14,304'	CTS

Cement

Conductor:	Premium NE-1 + 2% bwoc CaC12 + 46.5% Fresh Water – Conductor Cement mixed at 15.6 ppg, Y=1.2
Surface:	Premium NE-1 + 2% bwoc CaC12 + 46.5% Fresh Water – Surface Cement mixed at 15.6 ppg, Y=1.2
Intermediate:	Premium NE-1 + 1% bwoc CaC12 + 46.5% Fresh Water – Intermediate Cement mixed at 15.6 ppg, Y=1.19
Kick Off Plug:	Class H Cement + 1% CD-32 + .7% Sodium Metasilicate + .1% R-3 + .75 gal/100sk FP-13L - KOP Plug
Production:	50.50 Poz: Premium NE-1 + .1% bwoc ASA-301 + 60lb/sk ASCA-1 + .35% bwoc BA-10A + .25% bwoc MPA-170, 44 lb sack + .5% bwoc R-3 + .75 gals/100sk FP-13L – Production Cement mixed at 15.2ppg, Y = 1.19

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Office of Oil and Gas

APR 17 2018

WV Department of
Environmental Protection

06/15/2018

47051 02039



April 10, 2018

Mr. James Martin, Chief – Office of Oil and Gas
WV Department of Environmental Protection
601 57th Street SE
Charleston, WV 25304-2345

RE: Lily Well Pad

Mr. Martin:

As a result of conversations with the DEP earlier this month, we are submitting this letter upon your request to explain the existing wetlands on Tug Hill's Lily pad.

Gastar Exploration constructed the Lily Pad in 2012. Tug Hill obtained the pad in 2016 with the acquisition of Gastar's Appalachia assets. When the pad was obtained, the Lily pad had existing wetlands as a direct result of oil and gas operations.

In February of 2018, Tug Hill began submitting permit applications to add more wells to the existing Lily pad. No pad expansion has been proposed or constructed with the submittal of the new permit applications. The proposed wells for the Lily Pad are as follows:

Well Name	API#
Weller 1HM	(contained in this submission)
Weller 2HM	(contained in this submission)
Weller 3HM	(contained in this submission)
Weller 4HM	47-051-02020
Weller 5HM	(contained in this submission)
Weller 6HM	(contained in this submission)
Weller 7HM	(contained in this submission)

These are all the wells that are planned at this time. If we decide to add more wells in the future, this letter will be updated to reflect those changes. If you have any questions, please let me know.

Thank you for your consideration.

Sincerely,

Jonathan White
Regulatory Analyst

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Area of Review**Sources of information to Support 35CSR8 - 5.11: 9.3 et seq.**

Description of process to identify potential pathways for well communication during hydraulic fracturing activities.

Data Sources Reviewed:

1. IHS Well Data service: Public nationwide data service that pulls directly from State agency Oil and Gas databases
2. Farm Maps
3. Topo Maps: Recent and older (contact WVGES)
4. Check with DPS

Contacted Devin Ducoeur 724-705-0444, dducoeur@dpslandservices.com DPS GIS (12/19/2016) to have him make maps of the wellbores with his information. DPS utilizes WVGES maps for their mapping seems it as the best publicly available. See attached map he provided.

Request maps for:

1. Wellbore with IHS All Wells Layer
2. Map with Farm lines overlain and any well spots identified on Farm Maps
3. More recent (1970s vintage) topos and older topos

Discussion with Phil Dinterman WVGES GIS Department (7/15/2016)

- WVGES has plotted every well spot they have access to and are aware of with that contains a coordinate. 30000, 70000, and 90000 series wells are available via the WVGES online map. Some locations aren't great due to vintage and manipulation of maps through time
- 30000 series – any well drilled prior to 1929 – APIs were not assigned to original wells
- 70000 series – Well spots pulled from old Farm line maps that the WVGES has access to
- 90000 series – Any sources that the WVGES has access that shows a well spot but has no additional supporting information. DEP does not have 90000 series on their maps.
- There can be duplication between wells in the 3 series
- Phil indicated that other Operators are providing a screenshot of the WVGES map with their planned well and using that for permits

Permit well - Weller-7HM

Wells within 500' Buffer

Note: Well spots depicted on Area of Review map (page 3) are derived from State held coordinates. The spots may differ from those depicted on the Well Plat because the Plat locations represent actual field surveyed locations. Please refer to the Plat for surveyed well spots

API Number	Operator Name	Total Depth	Perforated Fms	Producing zones not perforated	Is this well "known or reasonably expected to penetrate a depth that could be within the range of Fracture propagation"? 1000' is max limit I would assign to wells that might be within in range of fracture propagation	Comments
4705101551	Tug Hill Operating	6508' TVD 12497' MD	Marcellus	Unknown	Yes, existing Marcellus producer. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore.	Producing Marcellus horizontal well. A field survey was conducted to locate this well and it was found producing at the location shown on the well plat.
4705101552	Tug Hill Operating	6508' TVD 12544' MD	Marcellus	Unknown	Yes, existing Marcellus producer. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore.	Producing Marcellus horizontal well. A field survey was conducted to locate this well and it was found producing at the location shown on the well plat.
4705101553	Tug Hill Operating	6503' TVD 12434' MD	Marcellus	Unknown	Yes, existing Marcellus producer. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore.	Producing Marcellus horizontal well. A field survey was conducted to locate this well and it was found producing at the location shown on the well plat.
4705101554	Tug Hill Operating	6512' TVD 12142' MD	Marcellus	Unknown	Yes, existing Marcellus producer. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore.	Producing Marcellus horizontal well. A field survey was conducted to locate this well and it was found producing at the location shown on the well plat.
4705100213	Elored Linigen	2894' TVD	Hampshire Group	Unknown	No, the well is not deep enough to be within the expected fracture propagation from a Marcellus stimulation. The well is plugged.	Well was plugged on 7/20/1950. A field survey was conducted to locate this well and no evidence of this well was found.
4705100308	Arrowhead Exploration Co	3500' TVD	Fifth Sand	Unknown	No, the well is not deep enough to be within the expected fracture propagation from a Marcellus stimulation. The well is plugged.	Well was plugged on 8/30/1957. A field survey was conducted to locate this well and no evidence of this well was found.

WV Geological & Economic Survey
Well: County = 51 Permit = 01551
Report Time: Friday, January 12, 2018 12:3

Location Information: View Map
 API: COUNTY PERMIT TAX_DISTRICT QUAD_75 QUAD_15
 4705101551 01551 1551
 System Data Location Information:
 API: EP_FLAG UTM6 UTM8 LOW_BD LAT_DD
 4705101551 1 As Proposed 41414.4 4154563.3 30.3 20073.75 742654

Owner Information:
 API: CMP_FID SURFIC STATUS SURFACE_OWNER WELL_NUM CO_NUM LEASE LEASE_NUM MINERAL_OWN OPERATOR_OA COMPLETION PRIOR_WD PRIOR_FID_FID_TFR_FID_FID
 4705101551 121 F0122 Over Conpl Loc Completed 1405401 51 182-2406 WV-11-2010-2000WV-11-0075-001/WV-11-0013-000 ULA P Nelson et al Qester Exploration USA Inc 6700 Metairie St

Completion Information:
 API: CMP_ID SPUD_DT ELEV DATUM FID1D DEEPSEF_FID DEEPSEF_FMT INVRAL_CLASS FINAL_CLASS TYPE INR CMP_MFRID TVD TMD NEW_FID C_REF C_AIT C_IBP C_APT NGL_REF NGL_WAL
 4705101551 121 F0122 9/22/2012 1212 Unperf Locm Complete Owner Unperf 50 Marcellus 50 Deactivated well Deactivated Well Oil and Gas Rusty Production 6700 12105 12105 3005 99 121

Copyright: 12/17/2012. Additional Lease Numbers: 12560203-001

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06/15/2018
WV Department of
Environmental Protection

WGES Pipeline

Select County: (051) Marshall | Select datatypes: (Check All)

Enter Permit #: 01552

Get Data | Reset

Table Descriptions: County Code Translations, Permit Numbering Series, Union Notes, Control Information, Discharges, WGS Data, Pipeline Status

WV Geological & Economic Survey | Well: County = 51 Permit = 01552 | Report time: Friday, January 12, 2018 12:59

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LONG_DD	UTME	UTMN
470510152	Marshall	1552	Franklin	New Martinsville	39.737931	-80.809312	470501.4	670002.0	

Bottom Hole Location Information

API	EP_FLAG	UTME	UTMN	LONG_DD	LAT_DD
470510152	As Proposed	470501.4	670002.0	-80.809312	39.737931

Owner Information

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VO	PROP_TRGT	FM	TYM_EST	FR
470510152	12/17/12	Original Loc	Completed	Uia South	1	1	Uia South	UW-14-0005-00000114-0076-001	UWVH-2011-0001	U.A. F. Nelson et al.	Open	Exploration	U.S.A. Inc.	8700	Marcella Sh

Completion Information

API	CMP_DT	SPUD_DT	ELEV_DATUM	FIELD	DEEPEST_FM	DEEPEST_FMI	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	G_BEP	G_APT	O_BEP	O_APT	NGL_BEP	NGL_APT
470510152	12/17/12	8/7/12	8700.0	1272	2840	2840	Marcella Sh	Marcella Sh	Development Well	Development Well	Open	600	12466	12466	3732	3446	0	0	0	120

Comments: 12/17/2012: Additional Lease Numbers: 12500000001

WGES Pipeline

Select County: (051) Marshall | Select datatypes: (Check All)

Enter Permit #: 01553

Get Data | Reset

Table Descriptions: County Code Translations, Permit Numbering Series, Union Notes, Control Information, Discharges, WGS Data, Pipeline Status

WV Geological & Economic Survey | Well: County = 51 Permit = 01553 | Report Time: Friday, January 12, 2018 12:54

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LONG_DD	UTME	UTMN
470510153	Marshall	1553	Franklin	New Martinsville	39.737449	-80.806749	470501.1	670001.5	

Bottom Hole Location Information

API	EP_FLAG	UTME	UTMN	LONG_DD	LAT_DD
470510153	As Proposed	470501.2	670001.5	-80.806749	39.737449

Owner Information

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VO	PROP_TRGT	FM	TYM_EST	FR
470510153	12/17/12	Original Loc	Completed	Uia South	1	1	Uia South	UW-14-0005-00000114-0076-001	UWVH-2011-0001	U.A. F. Nelson et al.	Open	Exploration	U.S.A. Inc.	8700	Marcella Sh

Completion Information

API	CMP_DT	SPUD_DT	ELEV_DATUM	FIELD	DEEPEST_FM	DEEPEST_FMI	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	G_BEP	G_APT	O_BEP	O_APT	NGL_BEP	NGL_APT
470510153	12/17/12	8/7/12	8700.0	1272	2840	2840	Marcella Sh	Marcella Sh	Development Well	Development Well	Open	600	12466	12466	3446	3446	0	0	0	120

Comments: 12/17/2012: Additional Lease Numbers: 12542000001

WGES Pipeline

Select County: (051) Marshall | Select datatypes: (Check All)

Enter Permit #: 01554

Get Data | Reset

Table Descriptions: County Code Translations, Permit Numbering Series, Union Notes, Control Information, Discharges, WGS Data, Pipeline Status

WV Geological & Economic Survey | Well: County = 51 Permit = 01554 | Report time: Friday, January 12, 2018 12

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LONG_DD	UTME	UTMN
470510154	Marshall	1554	Franklin	New Martinsville	39.737449	-80.806749	470501.1	670001.5	

Bottom Hole Location Information

API	EP_FLAG	UTME	UTMN	LONG_DD	LAT_DD
470510154	As Proposed	470501.6	670001.4	-80.806777	39.736201

Owner Information

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VO	PROP_TRGT	FM	TYM_EST	FR
470510154	12/17/12	Original Loc	Completed	Uia South	1	1	Uia South	UW-14-0005-00000114-0076-001	UWVH-2011-0001	U.A. F. Nelson et al.	Open	Exploration	U.S.A. Inc.	8700	Marcella Sh

Completion Information

API	CMP_DT	SPUD_DT	ELEV_DATUM	FIELD	DEEPEST_FM	DEEPEST_FMI	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	G_BEP	G_APT	O_BEP	O_APT	NGL_BEP	NGL_APT
470510154	12/17/12	8/7/12	8700.0	1272	2840	2840	Marcella Sh	Marcella Sh	Development Well	Development Well	Open	600	12466	12466	3446	3446	0	0	0	120

WGES Pipeline

Select County: (051) Marshall | Select datatypes: (Check All)

Enter Permit #: 00213

Get Data | Reset

Table Descriptions: County Code Translations, Permit Numbering Series, Union Notes, Control Information, Discharges, WGS Data, Pipeline Status

WV Geological & Economic Survey | Well: County = 51 Permit = 00213 | Report T

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LONG_DD	UTME	UTMN
4705100213	Marshall	213	Franklin	New Martinsville	39.735185	-80.807445	470501.9	6700716.8	

There is no Bottom Hole Location data for this well

Owner Information

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VO	PROP_TRGT	FM	TYM_EST	FR
4705100213	7/11/79	Original Loc	Completed	Uia Michrany	1	1	Uia Michrany			Linjen, Flored					

Completion Information

API	CMP_DT	SPUD_DT	ELEV_DATUM	FIELD	DEEPEST_FM	DEEPEST_FMI	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	G_BEP	G_APT	O_BEP	O_APT	NGL_BEP	NGL_APT
4705100213	7/11/79	5/16/79	1243	Ground Level	Unsuccessful	Unsuccessful	Marcella Sh	Marcella Sh	Drillout (Extension) Test	Unsuccessful	Dry	unknown	NatOpen H	2654						

There is no Pay data for this well

There is no Production Gas data for this well

There is no Production Oil data for this well ** some operators may have reported NGL under Oil

There is no Production NGL data for this well ** some operators may have reported NGL under Oil

There is no Production Water data for this well

Stratigraphy Information:

API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_QUALITY	THICKNESS	THICKNESS_QUALITY	ELEV DATUM
4705100213	Original Loc	Pittsburgh coal	CBM, Drifts Pk	750	Reasonable	2	Reasonable	1242 Ground Level
4705100213	Original Loc	unidentified coal	Well Record	826	Reasonable	2	Reasonable	1242 Ground Level
4705100213	Original Loc	1st Cow Run/Moundsville	Well Record	1035	Reasonable	49	Reasonable	1242 Ground Level
4705100213	Original Loc	Homewood section Cow Run	Well Record	1420	Reasonable	40	Reasonable	1242 Ground Level
4705100213	Original Loc	Get Sands (unconf)	Well Record	1508	Reasonable	114	Reasonable	1242 Ground Level
4705100213	Original Loc	Mason	Well Record	1605	Reasonable	50	Reasonable	1242 Ground Level
4705100213	Original Loc	Big Line	Well Record	1673	Reasonable	67	Reasonable	1242 Ground Level
4705100213	Original Loc	Greenbrier Group	Well Record	1823	Reasonable	152	Reasonable	1242 Ground Level
4705100213	Original Loc	Keener	Well Record	1950	Reasonable	12	Reasonable	1242 Ground Level
4705100213	Original Loc	Blount (Price eq)	Well Record	1973	Reasonable	236	Reasonable	1242 Ground Level

There is no Wireline (E-Log) data for this well

Plugging Information:

API	PLG_DT	DEPTH_FBT
4705100213	7/20/79	0

There is no Sample data for this well

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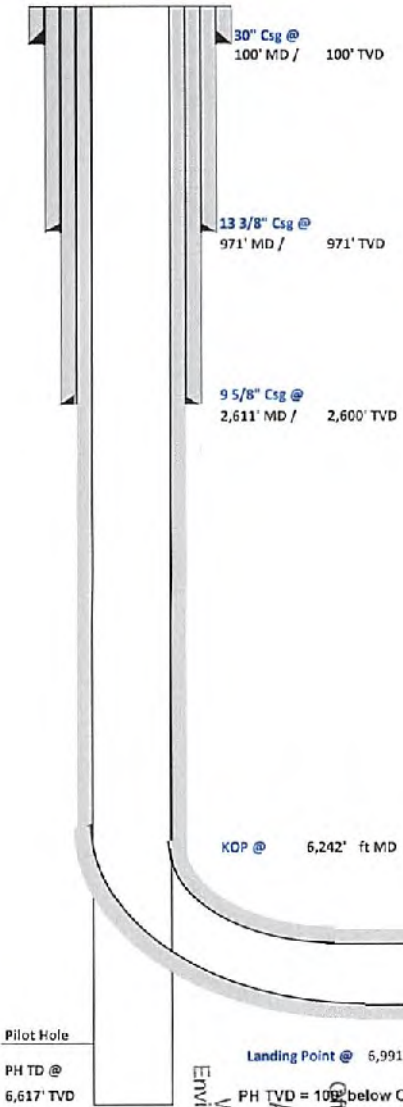


WELL NAME: **Weller-7HM**
 STATE: **West Virginia** COUNTY: **Marshall**
 DISTRICT: **Franklin**
 DE Elev: **1,273'** GL Elev: **1,273'**
 TD: **14,304'**
 TH Latitude: **39.73738114**
 TH Longitude: **-80.80636214**
 BH Latitude: **39.77807**
 BH Longitude: **-80.787873**

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	871
Sewickley Coal	778
Pittsburgh Coal	855
Big Lime	2013
Weir	2369
Berea	2553
Gordon	2863
Rhinestreet	5857
Gensson/Birkett	6365
Tully	6388
Hamilton	6417
Marcellus	6464
Landing Depth	6506
Onondaga	6517
Pilot Hole Depth	6517

CASING SUMMARY							
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Depth (TVD)	Weight (lb/ft)	Grade	Top of Cement
Conductor	36	30	100'	100'	BW	BW	Surface
Surface	17.5	13 3/8	971'	971'	54.5	J55	Surface
Intermediate 1	12 1/4	9 5/8	2,611'	2,600'	35	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	14,304'	6,634'	20	CYHP110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	291	A	15.6	Air	None
Surface	985	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	850	A	15	Air	1 Centralizer every other jt
Production	3,228	A	14.5	Air / SOBMM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc



Handwritten signature and date: 3/28/18

4705102039

Landing Point @ 6,991' MD / 6,506' TVD
 PH TD = 100' below Onondaga Top

Lateral TD @ 14,304' MD / 6,634' TVD

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Pilot Hole
 PH TD @
 6,617' TVD



Well: Weller 7 HM (D)
 Site: Lily/Weller
 Project: Marshall County, West Virginia
 Design: rev0

SECTION DETAILS

Stn	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSecl	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1600.00	0.00	0.00	1600.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2°/100' build
3	2000.00	8.00	185.00	1998.70	-27.77	-2.43	2.00	185.00	21.69	Begin 2°/100' build/turn
4	2771.54	16.73	117.90	2754.74	-133.85	91.58	2.00	-94.83	162.18	Begin 16.73° tangent
5	6241.58	16.73	117.90	6078.05	-601.19	974.26	0.00	0.00	1042.69	Begin 10°/100' build/turn
6	6990.57	89.00	150.00	6506.00	-1040.27	1305.26	10.00	33.39	1591.77	Begin 89.00° lateral section
7	14304.25	89.00	150.00	6634.00	-7373.05	4961.49	0.00	0.00	8886.97	PBHLTD 14304.25 MD/6634.00 TVD

Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD83 West Virginia - HARN
 Ellipsoid: GRS 1980
 Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level
 Depth Reference: CL @ 1273.00usft

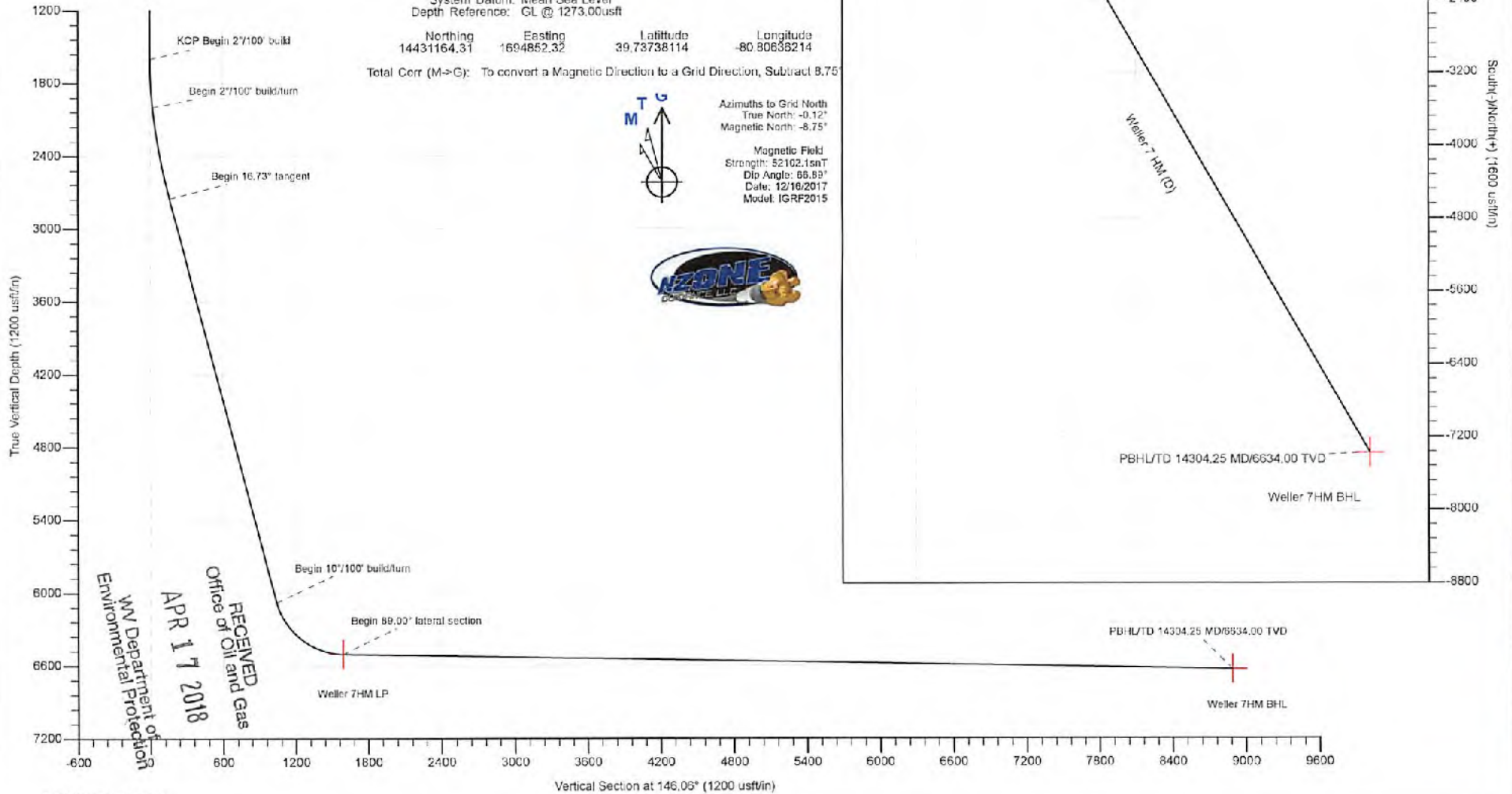
Northing	Easting	Latitude	Longitude
14431164.31	1694852.32	39.73738114	-80.80635214

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.75



Azimuths to Grid North
 True North: -0.12°
 Magnetic North: -8.75°

Magnetic Field
 Strength: 52102.15nT
 Dip Angle: 66.89°
 Date: 12/16/2017
 Model: IGRF2015



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47051 02039

47051 02039



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Weller 7 HM (D)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1273.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1273.00usft
Site:	Lily/Weller	North Reference:	Grid
Well:	Weller 7 HM (D)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Project	Marshall County, West Virginia		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD83 West Virginia - HARN		
Map Zone:	Zone 17N (84 W to 78 W)		

Site	Lily/Weller				
Site Position:		Northing:	14,431,189.55 usft	Latitude:	39.73745061
From:	Lat/Long	Easting:	1,694,826.67 usft	Longitude:	-80.80645320
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.12 "

Well	Weller 7 HM (D)					
Well Position	+N-S	0.00 usft	Northing:	14,431,164.31 usft	Latitude:	39.73738114
	+E-W	0.00 usft	Easting:	1,694,852.32 usft	Longitude:	-80.80636214
Position Uncertainty	0.00 usft	Wellhead Elevation:		Ground Level:	1,273.00 usft	

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/16/2017	-8.62	65.89	52,102.07053205

Design	rev0			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)
	0.00	0.00	0.00	146.06

Plan Survey Tool Program	Date	12/17/2017		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	14,304.25 rev0 (Original Hole)	MWD	MWD - Standard

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Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,000.00	8.00	185.00	1,998.70	-27.77	-2.43	2.00	2.00	0.00	185.00	
2,771.54	16.73	117.90	2,754.74	-133.85	91.58	2.00	1.13	-8.70	-94.83	
6,241.68	16.73	117.90	6,078.05	-601.19	974.26	0.00	0.00	0.00	0.00	
6,990.67	89.00	150.00	6,506.00	-1,040.27	1,305.26	10.00	9.65	4.29	33.39	Weller 7HM LP
14,304.25	89.00	150.00	6,634.00	-7,373.05	4,981.49	0.00	0.00	0.00	0.00	Weller 7HM BHL

WV Department of Environmental Protection

47 051 02039



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Weller 7 HM (D)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1273.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1273.00usft
Site:	Lily/Weller	North Reference:	Grid
Well:	Weller 7 HM (D)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
100.00	0.00	0.00	100.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
200.00	0.00	0.00	200.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
300.00	0.00	0.00	300.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
400.00	0.00	0.00	400.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
500.00	0.00	0.00	500.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
600.00	0.00	0.00	600.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
700.00	0.00	0.00	700.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
800.00	0.00	0.00	800.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
900.00	0.00	0.00	900.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
1,400.00	0.00	0.00	1,400.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
1,600.00	0.00	0.00	1,600.00	0.00	0.00	14,431,164.31	1,694,852.32	39.73738114	-80.80636214	
KOP Begin 2°/100' build										
1,700.00	2.00	185.00	1,699.98	-1.74	-0.15	14,431,162.58	1,694,852.17	39.73737637	-80.80636270	
1,800.00	4.00	185.00	1,799.84	-6.95	-0.61	14,431,157.36	1,694,851.71	39.73736205	-80.80636436	
1,900.00	6.00	185.00	1,899.45	-15.63	-1.37	14,431,148.68	1,694,850.95	39.73733821	-80.80636713	
2,000.00	8.00	185.00	1,998.70	-27.77	-2.43	14,431,136.54	1,694,849.89	39.73730488	-80.80637100	
Begin 2°/100' build/turn										
2,100.00	8.08	170.67	2,097.73	-41.64	-1.90	14,431,122.67	1,694,850.42	39.73726679	-80.80636921	
2,200.00	8.63	157.41	2,196.68	-55.51	-2.12	14,431,108.81	1,694,854.45	39.73722669	-80.80635501	
2,300.00	9.58	146.23	2,295.42	-69.35	9.63	14,431,094.96	1,694,861.95	39.73719062	-80.80632842	
2,400.00	10.81	137.31	2,393.85	-83.16	20.61	14,431,081.16	1,694,872.93	39.73715264	-80.80628945	
2,500.00	12.24	130.32	2,491.84	-96.91	35.06	14,431,067.40	1,694,867.38	39.73711478	-80.80623819	
2,600.00	13.82	124.83	2,589.26	-110.59	52.94	14,431,053.72	1,694,905.26	39.73707710	-80.80617466	
2,700.00	15.49	120.48	2,686.01	-124.19	74.25	14,431,040.12	1,694,926.58	39.73703964	-80.80608868	
2,771.54	16.73	117.90	2,754.74	-133.85	91.58	14,431,030.46	1,694,943.91	39.73701300	-80.80603739	
Begin 16.73° tangent										
2,800.00	16.73	117.90	2,782.00	-137.69	98.82	14,431,026.63	1,694,951.15	39.73700243	-80.80601167	
2,900.00	16.73	117.90	2,877.76	-151.15	124.26	14,431,013.16	1,694,976.58	39.73696529	-80.80592129	
3,000.00	16.73	117.90	2,973.53	-164.62	149.70	14,430,999.69	1,695,002.02	39.73692816	-80.80583091	
3,100.00	16.73	117.90	3,069.30	-178.09	175.13	14,430,986.23	1,695,027.45	39.73689102	-80.80574054	
3,200.00	16.73	117.90	3,165.07	-191.55	200.57	14,430,972.76	1,695,052.89	39.73685388	-80.80565016	
3,300.00	16.73	117.90	3,260.84	-205.02	226.00	14,430,959.29	1,695,078.33	39.73681675	-80.80555979	
3,400.00	16.73	117.90	3,356.61	-218.49	251.44	14,430,945.82	1,695,103.76	39.73677961	-80.80546941	
3,500.00	16.73	117.90	3,452.38	-231.96	276.88	14,430,932.36	1,695,129.20	39.73674247	-80.80537903	
3,600.00	16.73	117.90	3,548.14	-245.42	302.31	14,430,918.89	1,695,154.63	39.73670533	-80.80528866	
3,700.00	16.73	117.90	3,643.91	-258.89	327.75	14,430,905.42	1,695,180.07	39.73666820	-80.80519828	
3,800.00	16.73	117.90	3,739.68	-272.36	353.19	14,430,891.96	1,695,205.51	39.73663106	-80.80510791	
3,900.00	16.73	117.90	3,835.45	-285.83	378.62	14,430,878.49	1,695,230.94	39.73659392	-80.80501753	
4,000.00	16.73	117.90	3,931.22	-299.29	404.06	14,430,865.02	1,695,256.38	39.73655679	-80.80492716	
4,100.00	16.73	117.90	4,026.99	-312.76	429.49	14,430,851.55	1,695,281.82	39.73651965	-80.80483678	
4,200.00	16.73	117.90	4,122.76	-326.23	454.93	14,430,838.09	1,695,307.25	39.73648251	-80.80474641	
4,300.00	16.73	117.90	4,218.53	-339.69	480.37	14,430,824.62	1,695,332.69	39.73644537	-80.80465603	
4,400.00	16.73	117.90	4,314.29	-353.16	505.80	14,430,811.15	1,695,358.12	39.73640824	-80.80456565	
4,500.00	16.73	117.90	4,410.06	-366.63	531.24	14,430,797.69	1,695,383.56	39.73637110	-80.80447528	
4,600.00	16.73	117.90	4,505.83	-380.10	556.67	14,430,784.22	1,695,409.00	39.73633396	-80.80438491	
4,700.00	16.73	117.90	4,601.60	-393.56	582.11	14,430,770.75	1,695,434.43	39.73629682	-80.80429453	
4,800.00	16.73	117.90	4,697.37	-407.03	607.55	14,430,757.28	1,695,459.87	39.73625969	-80.80420416	
4,900.00	16.73	117.90	4,793.14	-420.50	632.98	14,430,743.82	1,695,485.30	39.73622255	-80.80411378	

47051 02039



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Weller 7 HM (D)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1273.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1273.00usft
Site:	Lily/Weller	North Reference:	Grid
Well:	Weller 7 HM (D)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
5,000.00	16.73	117.90	4,888.91	-433.97	658.42	14,430,730.35	1,695,510.74	39.73618541	-80.80402341	
5,100.00	16.73	117.90	4,984.67	-447.43	683.86	14,430,716.88	1,695,536.18	39.73614827	-80.80393303	
5,200.00	16.73	117.90	5,080.44	-460.90	709.29	14,430,703.41	1,695,561.61	39.73611114	-80.80384266	
5,300.00	16.73	117.90	5,176.21	-474.37	734.73	14,430,689.95	1,695,587.05	39.73607400	-80.80375229	
5,400.00	16.73	117.90	5,271.98	-487.83	760.16	14,430,676.48	1,695,612.49	39.73603688	-80.80366191	
5,500.00	16.73	117.90	5,367.75	-501.30	785.60	14,430,663.01	1,695,637.92	39.73599972	-80.80357154	
5,600.00	16.73	117.90	5,463.52	-514.77	811.04	14,430,649.55	1,695,663.36	39.73596258	-80.80348116	
5,700.00	16.73	117.90	5,559.29	-528.24	836.47	14,430,636.08	1,695,688.79	39.73592544	-80.80339079	
5,800.00	16.73	117.90	5,655.05	-541.70	861.91	14,430,622.61	1,695,714.23	39.73588831	-80.80330042	
5,900.00	16.73	117.90	5,750.82	-555.17	887.34	14,430,609.14	1,695,739.67	39.73585117	-80.80321004	
6,000.00	16.73	117.90	5,846.59	-568.64	912.78	14,430,595.68	1,695,765.10	39.73581403	-80.80311967	
6,100.00	16.73	117.90	5,942.36	-582.11	938.22	14,430,582.21	1,695,790.54	39.73577689	-80.80302930	
6,200.00	16.73	117.90	6,038.13	-595.57	963.65	14,430,568.74	1,695,815.97	39.73573975	-80.80293892	
6,241.68	16.73	117.90	6,078.05	-601.19	974.26	14,430,563.13	1,695,826.58	39.73572427	-80.80290125	
Begin 10°/100' build/turn										
6,300.00	21.83	126.55	6,133.09	-611.59	990.40	14,430,552.74	1,695,842.72	39.73569563	-80.80284392	
6,400.00	31.15	134.77	6,222.52	-640.94	1,023.78	14,430,523.38	1,695,876.10	39.73561480	-80.80272541	
6,500.00	40.77	139.44	6,303.38	-684.07	1,063.47	14,430,480.24	1,695,915.79	39.73549510	-80.80258455	
6,600.00	50.52	142.57	6,373.21	-739.67	1,108.28	14,430,424.64	1,695,960.60	39.73534314	-80.80242561	
6,700.00	60.34	144.92	6,429.89	-806.04	1,158.83	14,430,358.27	1,696,009.15	39.73516058	-80.80225343	
6,800.00	70.18	146.85	6,471.69	-881.17	1,207.65	14,430,283.15	1,696,059.98	39.73495395	-80.80207323	
6,900.00	80.05	148.55	6,497.35	-962.77	1,259.21	14,430,201.55	1,696,111.53	39.73472954	-80.80189050	
6,980.67	89.00	150.00	6,506.00	-1,040.27	1,305.26	14,430,124.04	1,696,157.59	39.73451640	-80.80172728	
Begin 89.00° lateral section										
7,000.00	89.00	150.00	6,506.16	-1,046.35	1,309.93	14,430,115.96	1,696,162.25	39.73449418	-80.80171075	
7,100.00	89.00	150.00	6,507.91	-1,134.94	1,359.92	14,430,029.37	1,696,212.24	39.73425507	-80.80153361	
7,200.00	89.00	150.00	6,509.66	-1,221.53	1,409.92	14,429,942.78	1,696,262.24	39.73401797	-80.80135647	
7,300.00	89.00	150.00	6,511.41	-1,308.12	1,459.91	14,429,856.19	1,696,312.23	39.73377987	-80.80117933	
7,400.00	89.00	150.00	6,513.16	-1,394.71	1,509.90	14,429,769.60	1,696,362.22	39.73354176	-80.80100219	
7,500.00	89.00	150.00	6,514.91	-1,481.30	1,559.89	14,429,683.01	1,696,412.21	39.73330365	-80.80082505	
7,600.00	89.00	150.00	6,516.66	-1,567.89	1,609.88	14,429,596.42	1,696,462.21	39.73306555	-80.80064792	
7,700.00	89.00	150.00	6,518.41	-1,654.48	1,659.88	14,429,509.84	1,696,512.20	39.73282744	-80.80047078	
7,800.00	89.00	150.00	6,520.16	-1,741.07	1,709.87	14,429,423.25	1,696,562.19	39.73258934	-80.80029365	
7,900.00	89.00	150.00	6,521.92	-1,827.66	1,759.86	14,429,336.66	1,696,612.18	39.73235123	-80.80011652	
8,000.00	89.00	150.00	6,523.67	-1,914.25	1,809.85	14,429,250.07	1,696,662.18	39.73211312	-80.79993939	
8,100.00	89.00	150.00	6,525.42	-2,000.84	1,859.85	14,429,163.48	1,696,712.17	39.73187502	-80.79976226	
8,200.00	89.00	150.00	6,527.17	-2,087.43	1,909.84	14,429,076.89	1,696,762.16	39.73163691	-80.79958513	
8,300.00	89.00	150.00	6,528.92	-2,174.01	1,959.83	14,428,990.30	1,696,812.15	39.73139880	-80.79940800	
8,400.00	89.00	150.00	6,530.67	-2,260.60	2,009.82	14,428,903.71	1,696,862.14	39.73116069	-80.79923087	
8,500.00	89.00	150.00	6,532.42	-2,347.19	2,059.82	14,428,817.12	1,696,912.14	39.73092259	-80.79905375	
8,600.00	89.00	150.00	6,534.17	-2,433.78	2,109.81	14,428,730.53	1,696,962.13	39.73068448	-80.79887663	
8,700.00	89.00	150.00	6,535.92	-2,520.37	2,159.80	14,428,643.94	1,697,012.12	39.73044637	-80.79869950	
8,800.00	89.00	150.00	6,537.67	-2,606.96	2,209.79	14,428,557.35	1,697,062.11	39.73020826	-80.79852238	
8,900.00	89.00	150.00	6,539.42	-2,693.55	2,259.79	14,428,470.76	1,697,112.11	39.72997015	-80.79834526	
9,000.00	89.00	150.00	6,541.17	-2,780.14	2,309.78	14,428,384.17	1,697,162.10	39.72973204	-80.79816814	
9,100.00	89.00	150.00	6,542.92	-2,866.73	2,359.77	14,428,297.58	1,697,212.09	39.72949393	-80.79799103	
9,200.00	89.00	150.00	6,544.67	-2,953.32	2,409.76	14,428,211.00	1,697,262.08	39.72925582	-80.79781391	
9,300.00	89.00	150.00	6,546.42	-3,039.91	2,459.75	14,428,124.41	1,697,312.08	39.72901771	-80.79763680	
9,400.00	89.00	150.00	6,548.17	-3,126.50	2,509.75	14,428,037.82	1,697,362.07	39.72877960	-80.79745968	
9,500.00	89.00	150.00	6,549.92	-3,213.09	2,559.74	14,427,951.23	1,697,412.06	39.72854149	-80.79728257	
9,600.00	89.00	150.00	6,551.67	-3,299.68	2,609.73	14,427,864.64	1,697,462.05	39.72830338	-80.79710546	
9,700.00	89.00	150.00	6,553.42	-3,386.26	2,659.72	14,427,778.05	1,697,512.05	39.72806527	-80.79692835	
9,800.00	89.00	150.00	6,555.17	-3,472.85	2,709.72	14,427,691.46	1,697,562.04	39.72782715	-80.79675124	
9,900.00	89.00	150.00	6,556.92	-3,559.44	2,759.71	14,427,604.87	1,697,612.04	39.72758904	-80.79657413	

Office of Oil and Gas

47 051 02039



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Weller 7 HM (D)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1273.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1273.00usft
Site:	Lily/Weller	North Reference:	Grid
Well:	Weller 7 HM (D)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,000.00	89.00	150.00	6,558.67	-3,646.03	2,809.70	14,427,516.28	1,697,662.02	39.72735093	-80.79639703
10,100.00	89.00	150.00	6,560.42	-3,732.62	2,859.69	14,427,431.69	1,697,712.01	39.72711282	-80.79621992
10,200.00	89.00	150.00	6,562.17	-3,819.21	2,909.69	14,427,345.10	1,697,762.01	39.72687471	-80.79604282
10,300.00	89.00	150.00	6,563.92	-3,905.80	2,959.68	14,427,258.51	1,697,812.00	39.72663659	-80.79586571
10,400.00	89.00	150.00	6,565.67	-3,992.39	3,009.67	14,427,171.92	1,697,861.99	39.72639848	-80.79568861
10,500.00	89.00	150.00	6,567.42	-4,078.98	3,059.66	14,427,085.34	1,697,911.98	39.72616037	-80.79551151
10,600.00	89.00	150.00	6,569.17	-4,165.57	3,109.65	14,426,998.75	1,697,961.98	39.72592225	-80.79533441
10,700.00	89.00	150.00	6,570.92	-4,252.16	3,159.65	14,426,912.16	1,698,011.97	39.72588414	-80.79515731
10,800.00	89.00	150.00	6,572.67	-4,338.75	3,209.64	14,426,825.57	1,698,061.96	39.72544602	-80.79498022
10,900.00	89.00	150.00	6,574.42	-4,425.34	3,259.63	14,426,738.98	1,698,111.95	39.72520791	-80.79480312
11,000.00	89.00	150.00	6,576.17	-4,511.93	3,309.62	14,426,652.39	1,698,161.95	39.72496979	-80.79462603
11,100.00	89.00	150.00	6,577.92	-4,598.51	3,359.62	14,426,565.80	1,698,211.94	39.72473168	-80.79444893
11,200.00	89.00	150.00	6,579.67	-4,685.10	3,409.61	14,426,479.21	1,698,261.93	39.72449356	-80.79427184
11,300.00	89.00	150.00	6,581.42	-4,771.69	3,459.60	14,426,392.62	1,698,311.92	39.72425545	-80.79409475
11,400.00	89.00	150.00	6,583.17	-4,858.28	3,509.59	14,426,306.03	1,698,361.92	39.72401733	-80.79391766
11,500.00	89.00	150.00	6,584.92	-4,944.87	3,559.59	14,426,219.44	1,698,411.91	39.72377921	-80.79374057
11,600.00	89.00	150.00	6,586.67	-5,031.46	3,609.58	14,426,132.85	1,698,461.90	39.72354110	-80.79356349
11,700.00	89.00	150.00	6,588.42	-5,118.05	3,659.57	14,426,046.26	1,698,511.89	39.72330298	-80.79338640
11,800.00	89.00	150.00	6,590.17	-5,204.64	3,709.56	14,425,959.67	1,698,561.88	39.72306486	-80.79320932
11,900.00	89.00	150.00	6,591.92	-5,291.23	3,759.56	14,425,873.09	1,698,611.88	39.72282674	-80.79303223
12,000.00	89.00	150.00	6,593.67	-5,377.82	3,809.55	14,425,786.50	1,698,661.87	39.72258863	-80.79285515
12,100.00	89.00	150.00	6,595.42	-5,464.41	3,859.54	14,425,699.91	1,698,711.86	39.72235051	-80.79267807
12,200.00	89.00	150.00	6,597.17	-5,551.00	3,909.53	14,425,613.32	1,698,761.85	39.72211239	-80.79250099
12,300.00	89.00	150.00	6,598.92	-5,637.59	3,959.52	14,425,526.73	1,698,811.85	39.72187427	-80.79232391
12,400.00	89.00	150.00	6,600.67	-5,724.17	4,009.52	14,425,440.14	1,698,861.84	39.72163615	-80.79214683
12,500.00	89.00	150.00	6,602.42	-5,810.76	4,059.51	14,425,353.55	1,698,911.83	39.72139803	-80.79196976
12,600.00	89.00	150.00	6,604.17	-5,897.35	4,109.50	14,425,266.96	1,698,961.82	39.72115991	-80.79179268
12,700.00	89.00	150.00	6,605.92	-5,983.94	4,159.49	14,425,180.37	1,699,011.82	39.72092179	-80.79161561
12,800.00	89.00	150.00	6,607.67	-6,070.53	4,209.49	14,425,093.78	1,699,061.81	39.72068367	-80.79143854
12,900.00	89.00	150.00	6,609.42	-6,157.12	4,259.48	14,425,007.19	1,699,111.80	39.72044555	-80.79126147
13,000.00	89.00	150.00	6,611.17	-6,243.71	4,309.47	14,424,920.60	1,699,161.79	39.72020743	-80.79108440
13,100.00	89.00	150.00	6,612.92	-6,330.30	4,359.46	14,424,834.01	1,699,211.79	39.71996931	-80.79090733
13,200.00	89.00	150.00	6,614.67	-6,416.89	4,409.46	14,424,747.43	1,699,261.78	39.71973119	-80.79073026
13,300.00	89.00	150.00	6,616.42	-6,503.48	4,459.45	14,424,660.84	1,699,311.77	39.71949307	-80.79055319
13,400.00	89.00	150.00	6,618.17	-6,590.07	4,509.44	14,424,574.25	1,699,361.76	39.71925495	-80.79037613
13,500.00	89.00	150.00	6,619.92	-6,676.66	4,559.43	14,424,487.66	1,699,411.75	39.71901683	-80.79019906
13,600.00	89.00	150.00	6,621.67	-6,763.25	4,609.43	14,424,401.07	1,699,461.75	39.71877870	-80.79002200
13,700.00	89.00	150.00	6,623.42	-6,849.84	4,659.42	14,424,314.48	1,699,511.74	39.71854058	-80.78984494
13,800.00	89.00	150.00	6,625.18	-6,936.42	4,709.41	14,424,227.89	1,699,561.73	39.71830246	-80.78966788
13,900.00	89.00	150.00	6,626.93	-7,023.01	4,759.40	14,424,141.30	1,699,611.72	39.71806434	-80.78949082
14,000.00	89.00	150.00	6,628.68	-7,109.60	4,809.39	14,424,054.71	1,699,661.72	39.71782621	-80.78931376
14,100.00	89.00	150.00	6,630.43	-7,196.19	4,859.39	14,423,968.12	1,699,711.71	39.71758809	-80.78913671
14,200.00	89.00	150.00	6,632.18	-7,282.78	4,909.38	14,423,881.53	1,699,761.70	39.71734996	-80.78895965
14,300.00	89.00	150.00	6,633.93	-7,369.37	4,959.37	14,423,794.94	1,699,811.69	39.71711184	-80.78878260
14,304.25	89.00	150.00	6,634.00	-7,373.05	4,961.49	14,423,791.27	1,699,813.82	39.71710173	-80.78877508

PBHL/TD 14304.25 MD/6634.00 TVD

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APR 17 2018

06/15/2018

47 051 02039



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Weller 7 HM (D)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1273.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1273.00usft
Site:	Lily/Weller	North Reference:	Grid
Well:	Weller 7 HM (D)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Design Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
Weller 7HM LP - plan hits target center - Point	0.00	0.00	6,506.00	-1,040.27	1,305.26	14,430,124.04	1,896,157.59	39.73451640	-80.80172728
Weller 7HM BHL - plan hits target center - Point	0.00	0.00	6,634.00	-7,373.05	4,961.49	14,423,791.27	1,899,813.82	39.71710173	-80.78877508

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
1,600.00	1,600.00	0.00	0.00	KOP Begin 2°/100' build	
2,000.00	1,998.70	-27.77	-2.43	Begin 2°/100' build/turn	
2,771.54	2,754.74	-133.85	91.58	Begin 16.73° tangent	
6,241.68	6,078.05	-601.19	974.26	Begin 10°/100' build/turn	
6,990.67	6,506.00	-1,040.27	1,305.26	Begin 89.00° lateral section	
14,304.25	6,634.00	-7,373.05	4,961.49	PBHL/TD 14304.25 MD/6634.00 TVD	

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WV Department of
Environmental Protection

WW-9
(4/16)

47 05 102039

API Number 47 - 051 - _____
Operator's Well No. Wellar 7HM

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Tug Hill Operating, LLC OP Code 494510851

Watershed (HUC 10) French Creek - Ohio River Quadrangle New Martinsville 7.5'

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes No

Will a pit be used? Yes No

If so, please describe anticipated pit waste: AST Tanks with proper containment will be used for staging fresh water for frac and flow back water

Will a synthetic liner be used in the pit? Yes No If so, what ml.? AST Tanks will be used with proper containment

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection (UIC Permit Number UIC 2459, UIC 965, UIC 359, UIC 2D0732540, UIC 2D0732523)
- Reuse (at API Number _____)
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain _____)

Will closed loop system be used? If so, describe: Yes - For Vertical and Horizontal Drilling

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air for vertical / Oil for Horizontal

-If oil based, what type? Synthetic, petroleum, etc. Synthetic Oil Base

Additives to be used in drilling medium? Barite for weight

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. All drill cuttings to be disposed of in a Landfill

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A

-Landfill or offsite name/permit number? Wetzel County Sanitary Landfill (SWF-1021 / WV0109105) and Westmoreland Sanitary Landfill, LLC (GAN1405 / PA DEP EGM1366425)

Permittee shall provide written notice to the Office of Oil and Gas of any load of drill cuttings or associated waste rejected at any West Virginia solid waste facility. The notice shall be provided within 24 hours of rejection and the permittee shall also disclose where it was properly disposed.

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature _____

Company Official (Typed Name) Sean Gasser

Company Official Title Engineer

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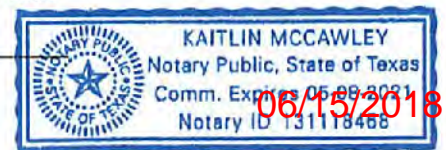
APR 17 2018

WV Department of
Environmental Protection

Subscribed and sworn before me this 2 day of February, 2018

Kaitlin McCawley Kaitlin McCawley Notary Public

My commission expires 05/08/2021



47051 02039

Form WW-9

Operator's Well No. Weller 7HM

Tug Hill Operating, LLC

Proposed Revegetation Treatment: Acres Disturbed 16.20 Prevegetation pH 6.0

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 500 lbs/acre

Mulch 2.5 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Annual Ryegrass	40	Orchard Grass	12
Spring Oats	96	Ladino	3
		White Clover	2

Attach:

Maps(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided). If water from the pit will be land applied, include dimensions (L x W x D) of the pit, and dimensions (L x W), and area in acreage, of the land application area.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Juan Velasco

Comments: _____

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WV Department of
Environmental Protection

Title: Oil & Gas Inspector Date: 2/5/18

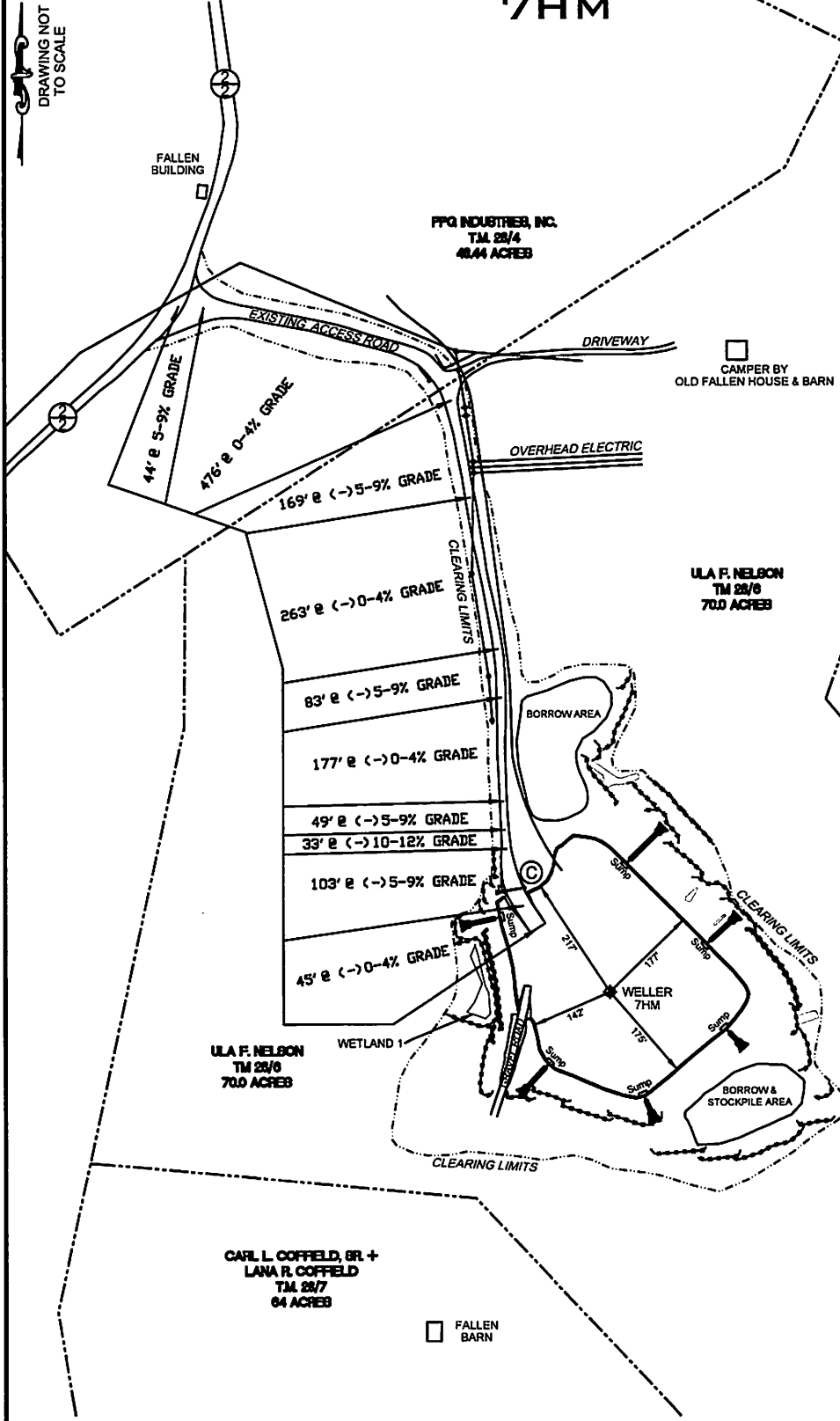
Field Reviewed? Yes No

06/15/2018

WW-9

**PROPOSED WELLER
7HM**

SUPPLEMENT PG 1



REFERENCE IS HEREBY MADE TO THE WV D.E.P. OFFICE OF OIL & GAS, "EROSION AND SEDIMENT CONTROL FIELD MANUAL" FOR REQUIREMENTS AND BMPs FOR AVERAGE FIELD CONDITIONS CONCERNING THE MAINTENANCE OF EXISTING ROADS AND THE CONSTRUCTION OF PROPOSED ROADS. FIELD CONDITIONS MAY REQUIRE VARIANCE FROM THESE GUIDELINES AND THE EARTHWORK CONTRACTOR IS RESPONSIBLE FOR NOTIFICATION TO THE INSPECTOR AND THE OPERATOR SHOULD THESE CONDITIONS OCCUR.

INSTALL CULVERTS AS SHOWN ON RECLAMATION PLAN OR AS FIELD CONDITIONS REQUIRE.

ENTRANCES ONTO PUBLIC ROADS SHALL BE CONSTRUCTED OR MAINTAINED IN ACCORDANCE WITH WV D.O.T. REGULATIONS. ADDITIONAL PERMITS MAY BE REQUIRED. TEMPORARILY SEED AND MULCH ALL SLOPES UPON CONSTRUCTION OF LOCATION.

ALL CUT AND FILL SLOPES ARE 2H : 1V SLOPE.

ALL TREES 6-INCHES AND ABOVE ARE TO BE CUT AND STACKED. BRUSH SLASHINGS ARE TO UTILIZED DOWN SLOPE OF SITE AND STRUCTURES TO ACT AS A CONTROL BARRIER IF AVAILABLE.

PPQ INDUSTRIES, INC.
TM 28/5
106.9 ACRES

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WV Department of
Environmental Protection
LEGEND

- Note:
- Ⓢ — Denotes existing culvert with appropriate sediment outlet control (Rip Rap splash pad).
 - Silt Fence and or Sediment and Erosion Control Measure.
 - Surface Boundary

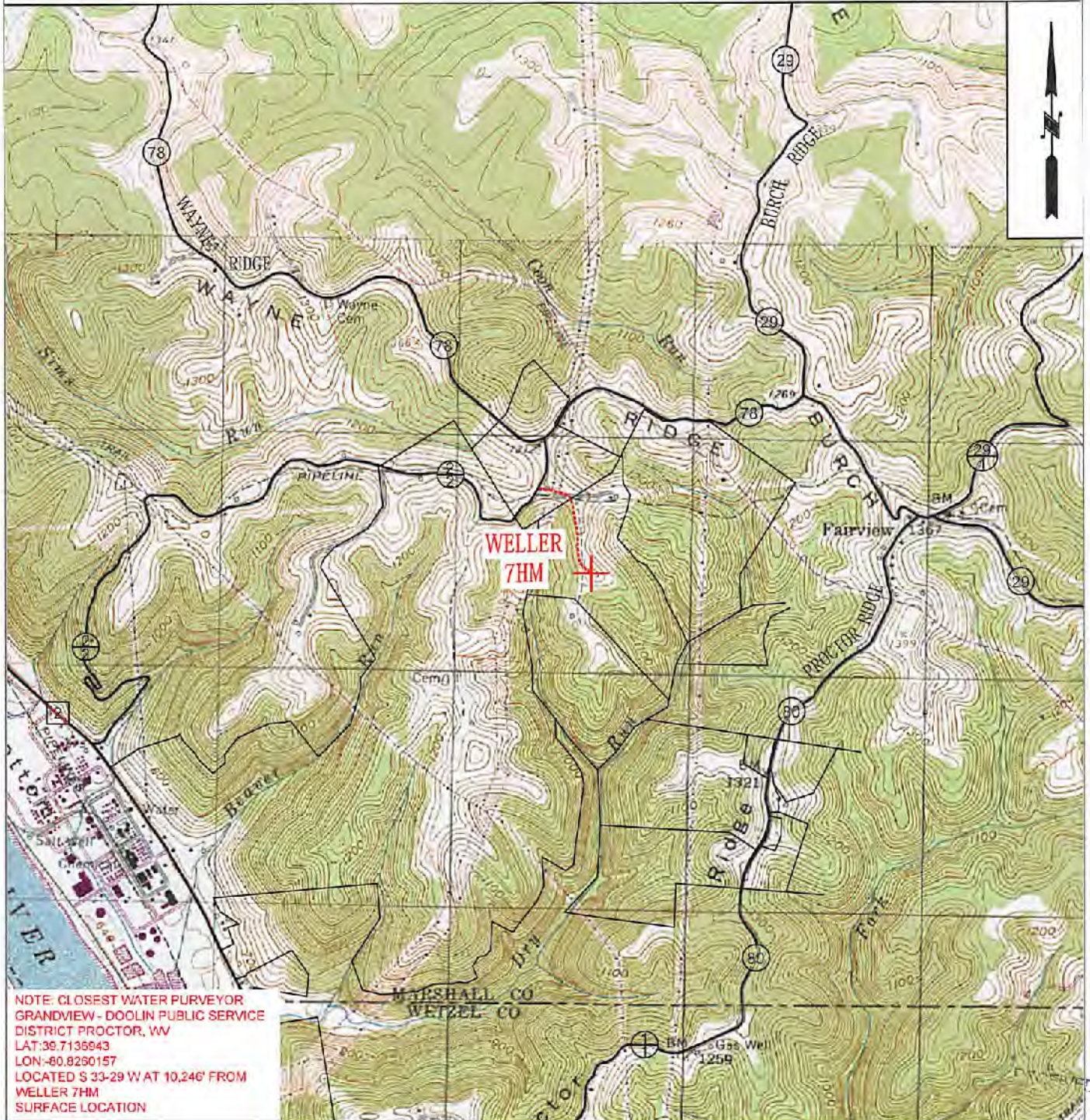
DATE: 01/16/2018 PROJECT NO: 494510851 DRAWN BY: J.A.H.

47 051 02039

WW-9

PROPOSED WELLER 7HM

SUPPLEMENT PG 2



TUG HILL
OPERATING

OPERATOR	494510851	TOPO SECTION	LEASE NAME
TUG HILL OPERATING, LLC 380 SOUTHPOINTE BLVD SUITE 200 CANONSBURG, PA 15317		NEW MARTINSVILLE 7.5'	WELLER, WV Department of Environmental Protection
		SCALE:	DATE:
		1" = 2000'	DATE: 01/16/2018

06/15/2018

47 05 102039



ju
2/28/18

Well Site Safety Plan

Tug Hill Operating, LLC

Well Name:Weller 7HM

Pad Location: Weller Pad

Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:

Northing: 4,398,627.68

Easting: 516,592.02

February 2018

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APR 17 2018

WV Department of
Environmental Protection

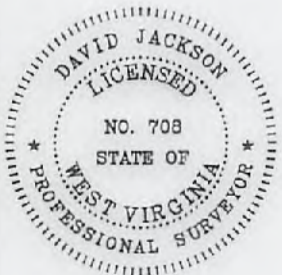
06/15/2018

4705102039

form wv6

WELLER LEASE
WELL N-7HM
545.232± ACRES

Number	TAX MAP-PARCEL	ADJOINER OWNER	ACRES
S1	22-7.1	TH EXPLORATION II, LLC & ATINUM MARCELLUS I, LLC	21.68
S2	22-7	PATRICIA ACCETTOLO ET AL.	25.02
S3	23-1	PATRICIA ACCETTOLO ET AL.	146.66
S4	23-28.2	MARK W. TENNANT ET AL.	10.80
S5	23-23	MICHAEL J. WILEY ET AL.	1.00
S6	23-24	MICHAEL J. WILEY ET AL.	0.25
S7	23-25	ARTHUR A. WILEY	0.43
S8	23-22	DANIEL D. RHYAND & LAUREL R. GREENE	6.25
S9	23-29	JAMES WILEY	0.25
S10	23-18.1	MARK A. YOHO	7.80
S11	23-17.1	CURTIS E. HALL ET UX	10.051
S12	23-17.2	DICK JR. & CAROL J. ROWAN	14.920
S13	26-7	DOMINION TRANSMISSION, INC.	71.00
S14	26-23	RICHARD JOSEPH OTTE	11.34
S15	26-14	THERESA A. WALTON, TRUSTEE OF ROBERT D. & BONNIE L. OLIVER TRUST	27.56
S16	2-4	EDITH SALEM & LISA G. LARSON	56.25
S17	2-4.1	TYRONE SULTZBACH & RICHARD WOLF	1.00
S18	27-23	ROBERT F. ROTHLSBERGER	35.77
S19	28-6	ULA F. NELSON	70.00
S20	26-1	EDWIN BOOTH ANDERSON & MARK W. ANDERSON	12.94
S21	26-2	EDWIN BOOTH ANDERSON & MARK W. ANDERSON	67.50
S22	26-4.5	ERIC JAY BOOTH	74.388
S23	26-4	JAMES R. & MELODY A. ANDERSON	3.887
S24	26-4.2	OTIS S. & GLENDA RUSH	1.58
S25	26-4.1	OTIS S. RUSH ET UX.	12.188
S26	26-4.3	CRYSTAL & RANDOPH F. MATASK	2.253
S27	26-4.4	OTIS F. & GLENDA M. RUSH	39.436
S28	26-18	ERIC JAY BOOTH	94.00



P.S. 708 *David L Jackson*

06/15/2018



TUG HILL
OPERATING

OPERATOR'S		
WELL #:	<u>Weller 7HM</u>	WELL PLAT
DISTRICT:	<u>Franklin</u>	PAGE 2 OF 2
COUNTY:	<u>Marshall</u>	DATE: 03/21/2018
STATE:	<u>WV</u>	

47051 02039

WW-6A1
(5/13)

Operator's Well No. Weller 7HM

**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 attached pages

**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

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.

Well Operator: Tug Hill Operating, LLC
 By: Amy L. Miller *Amy L. Miller*
 Its: Permitting Specialist - Appalachia Region

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Lease No.	Tags	Parcel	Lessor	Lessee	Royalty	Book	Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*14572	A	5-28-6	VICKI LYNN WOOD	CHESAPEAKE APPALACHIA LLC	1/8+	681	326	27/321 Chesapeake Appalachia LLC and Statoil USA Onshore Properties Inc to Gastar Exploration USA, Inc and Atinum Marcellus I LLC	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A	N/A
10*14573	A	5-28-6	AARON D LITMAN	CHESAPEAKE APPALACHIA LLC	1/8+	681	317	27/321 Chesapeake Appalachia LLC and Statoil USA Onshore Properties Inc to Gastar Exploration USA, Inc and Atinum Marcellus I LLC	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A	N/A
10*14574	A	5-28-6	KLOVA ANN MORRIS	CHESAPEAKE APPALACHIA LLC	1/8+	681	320	22/200 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc 32.5%	27/321 Chesapeake Appalachia LLC and Statoil USA Onshore Properties Inc to Gastar Exploration USA, Inc and Atinum Marcellus I LLC	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A
10*14575	A	5-28-6	REVA JUNE ICARD	CHESAPEAKE APPALACHIA LLC	1/8+	681	323	22/200 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc 32.5%	27/321 Chesapeake Appalachia LLC and Statoil USA Onshore Properties Inc to Gastar Exploration USA, Inc and Atinum Marcellus I LLC	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A
10*14576	A	5-28-6	WILLIAM L LITMAN	CHESAPEAKE APPALACHIA LLC	1/8+	681	329	22/200 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc 32.5%	27/321 Chesapeake Appalachia LLC and Statoil USA Onshore Properties Inc to Gastar Exploration USA, Inc and Atinum Marcellus I LLC	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A
10*14577	A	5-28-6	ULA NELSON	CHESAPEAKE APPALACHIA LLC	1/8+	681	332	22/200 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc 32.5%	27/321 Chesapeake Appalachia LLC and Statoil USA Onshore Properties Inc to Gastar Exploration USA, Inc and Atinum Marcellus I LLC	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A
10*14578	A	5-28-6	BETTY KNOWLES	GASTAR EXPLORATION USA INC	1/8+	767	36	27/639 Gastar to Atinum Marcellus I LLC (partial assign 50%)	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A	N/A
10*14916	B	5-26-1	MARK W BOOTH	GASTAR EXPLORATION INC	1/8+	836	110	32/428 Gastar Exploration USA Inc to Atinum Marcellus I LLC (partial assign 50%)	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A	N/A

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Lease No.	Tags	Parcel	Lessor	Lessee	Royalty	Book	Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*14917	B	5-26-1	EDWIN BOOTH ANDERSON	GASTAR EXPLORATION INC	1/8+	836	108	32/428 Gastar Exploration USA Inc to Atinum Marcellus I LLC (partial assign 50%)	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A	
10*14916	C	5-26-2	MARK W BOOTH	GASTAR EXPLORATION INC	1/8+	836	110	32/428 Gastar Exploration USA Inc to Atinum Marcellus I LLC (partial assign 50%)	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A	
10*14917	C	5-26-2	EDWIN BOOTH ANDERSON	GASTAR EXPLORATION INC	1/8+	836	108	32/428 Gastar Exploration USA Inc to Atinum Marcellus I LLC (partial assign 50%)	21/41 Gastar Exploration USA, Inc merger Gastar Exploration Inc	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC
10*17153	D	5-26-4.5	ALLEN J AND BARBARA A SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	687	46	23/16 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC
10*17137	D	5-26-4.5	MARK E AND VALERIE J SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	685	521	22/235 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC
10*17187	D	5-26-4.5	MARK E AND VALERIE SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	710	107	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC	N/A
10*17153	E	5-26-4	ALLEN J AND BARBARA A SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	687	46	23/16 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC
10*17137	E	5-26-4	MARK E AND VALERIE J SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	685	521	22/235 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC

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10*17187	E	5-26-4	MARK E AND VALERIE SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	710	107	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC	
10*17153	F	5-26-4.2	ALLEN J AND BARBARA A SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	687	46	23/16 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC
10*17137	F	5-26-4.2	MARK E AND VALERIE J SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	685	521	22/235 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC
10*17153	G	5-26-4.1	ALLEN J AND BARBARA A SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	687	46	23/16 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC
10*17137	G	5-26-4.1	MARK E AND VALERIE J SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	685	521	22/235 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC
10*17153	H	5-26-4.3	ALLEN J AND BARBARA A SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	687	46	23/16 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC
10*17137	H	5-26-4.3	MARK E AND VALERIE J SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	685	521	22/235 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC
10*17153	I	5-26-4.4	ALLEN J AND BARBARA A SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	687	46	23/16 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC

Lease No.	Tags	Parcel	Lessor	Lessee	Royalty	Book	Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*17137	I	5-26-4.4	MARK E AND VALERIE J SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	685	521	22/235 Chesapeake Appalachia, LLC to Statoil USA Onshore Properties, Inc	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC
10*17187	I	5-26-4.4	MARK E AND VALERIE SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	710	107	33/110 Chesapeake Appalachia, LLC to SWN Production Company, LLC	850/396 Statoil USA Onshore Properties Inc and SWN Production Company LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC (merger)	41/256 SWN Production Company, LLC to TH Exploration, LLC	
10*19733	J	5-26-18	GEORGE E BOOTH SR AND MARGARET E BOOTH	TH EXPLORATION LLC	1/8+	944	575	N/A	N/A	N/A	N/A	N/A	N/A
10*19910	J	5-26-18	GOLDA KATHLEEN BOOTH ANDERSON	TH EXPLORATION LLC	1/8+	945	440	N/A	N/A	N/A	N/A	N/A	N/A
10*21450	J	5-26-18	ERIC JAY BOOTH	TH EXPLORATION LLC	1/8+	953	258	N/A	N/A	N/A	N/A	N/A	N/A
953928	K	5-26-17	APPALACHIAN BASIN MINERALS, LP	CHEVRON USA INC	1/8+	950	128	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
953931	K	5-26-17	MARCELLUS TX MINERAL PARTNERS LTD	CHEVRON USA INC	1/8+	950	131	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
953930	K	5-26-17	MCCROW ENERGY PARTNERS II LLC	CHEVRON USA INC	1/8+	950	122	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A

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Lease No.	Tags	Parcel	Lessor	Lessee	Royalty	Book	Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
953929	K	5-26-17	PENN MARC RESOURCES II LP	CHEVRON USA INC	1/8+	950	137	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
953913	K	5-26-17	PURPLEBURGH VENTURES LLC	CHEVRON USA INC	1/8+	950	125	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
WV-MAR-0287	K	5-26-17	VENABLE ROYALTY, LTD	AMERICAN PETROLEUM PARTNERS OPERATING LLC	1/8+	923	572	41/380 American Petroleum Partners Operating, LLC to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
WV-MAR-0287	K	5-26-17	VENRO, LTD	AMERICAN PETROLEUM PARTNERS OPERATING LLC	1/8+	923	572	41/380 American Petroleum Partners Operating, LLC to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
953927	K	5-26-17	WILDES MINERAL INTERESTS, LLC	CHEVRON USA INC	1/8+	950	134	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
953928	L	5-26-16	APPALACHIAN BASIN MINERALS, LP	CHEVRON USA INC	1/8+	950	128	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
953931	L	5-26-16	MARCELLUS TX MINERAL PARTNERS LTD	CHEVRON USA INC	1/8+	950	131	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
953930	L	5-26-16	MCCROW ENERGY PARTNERS II LLC	CHEVRON USA INC	1/8+	950	122	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A

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Lease No.	Tags	Parcel	Lessor	Lessee	Royalty	Book	Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
953929	L	5-26-16	PENN MARC RESOURCES II LP	CHEVRON USA INC	1/8+	950	137	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
953913	L	5-26-16	PURPLEBURGH VENTURES LLC	CHEVRON USA INC	1/8+	950	125	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
WV-MAR-0287	L	5-26-16	VENABLE ROYALTY, LTD	AMERICAN PETROLEUM PARTNERS OPERATING LLC	1/8+	923	572	41/380 American Petroleum Partners Operating, LLC to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
WV-MAR-0287	L	5-26-16	VENRO, LTD	AMERICAN PETROLEUM PARTNERS OPERATING LLC	1/8+	923	572	41/380 American Petroleum Partners Operating, LLC to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A
953927	L	5-26-16	WILDES MINERAL INTERESTS, LLC	CHEVRON USA INC	1/8+	950	134	41/411 Chevron U.S.A. Inc. to TH Exploration, LLC	N/A	N/A	N/A	N/A	N/A

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ASSIGNMENT OF OIL AND GAS LEASES

This ASSIGNMENT OF OIL AND GAS LEASES (the "Assignment") is made and entered into this 29th day of November, 2017 (the "Effective Date"), from TH Exploration II, LLC, a Texas limited liability company, having an address at 1320 S. University Drive, Suite 500, Fort Worth, TX 76107 (hereinafter "Assignor"), and TH Exploration, LLC, a Texas limited liability company, having an address at 1320 S. University Drive, Suite 500, Fort Worth, TX 76107 (hereinafter "Assignee").

WITNESSETH:

WHEREAS, Assignor is the owner of the right, title, and interest in those certain Oil and Gas Leases situated in Marshall County, West Virginia, which are described in Exhibit "A" and Exhibit "A-1" attached hereto and made a part hereof (hereinafter the "Leases"); and

WHEREAS, subject to the exceptions and reservations herein contained, Assignor desires to assign, set over, and transfer to Assignee all of Assignor's right, title, and interest in and to the Leases.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and subject to the limited warranties, restrictions and conditions hereinafter mentioned, the parties hereto, intending to be legally bound, do covenant and agree as follows:

1. Assignment. Assignor does hereby grant, bargain, sell, convey, deliver, assign, set over and transfer, as of the Effective Date, to Assignee, its respective successors and assigns, forever, subject to the terms, reservations, waivers and provisions as hereinafter set forth, an undivided interest of all of Assignor's right, title and interest in and to the Leases and all oil, natural gas, natural gas liquids, condensate, casinghead gas and other liquefied or gaseous hydrocarbons or products ("Hydrocarbons") thereby held, in any and all depths and formations ("Assigned Formations"), together with any and all other rights that are reasonably necessary or convenient to explore for and produce Hydrocarbons from the Assigned Formations, including, but not limited to, the right of surface access, use and occupancy, the right of ingress and egress, the right to conduct geophysical and other exploratory activities, the right to lay pipeline, the right to drill through, but not perforate or stimulate, all other depths and formations necessary for the purpose of reaching the Assigned Formations and to conduct operations therein.

TO HAVE AND TO HOLD such right, title and interest in and to the Leases unto Assignee or their designee, and their respective successors and assigns, forever, in accordance with the provisions of this Assignment.

2. Representations and Warranties. Assignor represents and warrants that such Assignor has not conveyed or otherwise encumbered its interest in the Leases since the time that Assignor obtained its interests in the Leases.

Assignor represents and warrants that, as to its interests in the Leases, Assignor has paid all royalties, overriding royalties, and other payments required by the Leases which were due for the period in which Assignor held its interests in the Leases, including, but not limited to, the interests assigned hereunder, and that Assignor has fully performed all conditions necessary to maintain the Leases in full force and effect during such period.

Assignor represents and warrants that, as to its interests in the Leases, Assignor shall not, by virtue of this Assignment or otherwise, retain any interest in the Assigned Formations, including, without limitation, any overriding royalty interest or working interest therein or with respect thereto.

3. Successors and Assigns. The terms of this Assignment shall be binding upon and inure to the benefit of the parties hereto and each of their respective successors

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06/15/2018

STATE OF WEST VIRGINIA §
§
COUNTY OF MARSHALL §

ASSIGNMENT AND CONVEYANCE

THIS ASSIGNMENT AND CONVEYANCE (the "Assignment") is made and entered into this 7th day of February, 2018 (the "Effective Date"), by and between CHEVRON U.S.A. INC. (hereinafter "Assignor") and TH EXPLORATION, LLC (hereinafter "Assignee") pursuant to the terms of that certain Acreage Trade Agreement between the Assignor and the Assignee dated August 1, 2018 (the "Acreage Trade Agreement"). Capitalized terms used but not defined herein and defined in the Acreage Trade Agreement shall have the meanings given to such terms in the Acreage Trade Agreement.

WITNESSETH:

WHEREAS, Assignor desires to assign, set over, and transfer to Assignee all of Assignor's right, title, and interest in and to those certain Oil and Gas Leases situated in Marshall County, West Virginia, as described in Exhibit "A", attached hereto and made a part hereof (hereinafter the "Leases"); and

WHEREAS, Assignor desires to assign, set over, and transfer to Assignee all of Assignor's right, title, and interest in and to the Leases as described below.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and subject to the limited warranties, restrictions and conditions hereinafter mentioned, the parties hereto, intending to be legally bound, do covenant and agree as follows:

1. Assignment. Assignor does hereby grant, bargain, sell, convey, deliver, assign, set over and transfer, as of the Effective Date, to Assignee, its respective successors and assigns, forever, all of Assignor's right, title and interest in and to the Leases, and the lands covered thereby, together with all rights incident thereto and appurtenances thereon, and that Assignor excepts and reserves from this Assignment the Chevron ORRI previously conveyed to Assignor and as described in that certain Memorandum of Assignment of Oil and Gas Lease Interests dated November 6, 2012 by and between Cornell Holdings Incorporated and Chevron U.S.A. Inc., which is recorded at Book 0028, Page 0239 in the Office of the County Clerk of Marshall County, West Virginia.

TO HAVE AND TO HOLD such right, title and interest in and to the Leases unto Assignee or its designee, and their respective successors and assigns, forever, in accordance with the provisions of this Assignment.

2. Special Warranty. Assignor represents and warrants that Assignor has not conveyed or otherwise encumbered (other than Permitted Encumbrances) its interest in the Leases since the time that Assignor obtained its interests in the Leases. Assignor does covenant, promise and agree, to and with the Assignee, its respective successors and assigns, to forever specially warrant and defend the title to the Leases or portions thereof included under this Assignment, unto the Assignee and its respective successors and assigns, against the lawful claims of Assignor, and all persons claiming, or to claim, the same or any part thereof, by, through or under Assignor.

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ASSIGNMENT OF OIL AND GAS LEASES

This ASSIGNMENT OF OIL AND GAS LEASES (the "Assignment") is made and entered into this 29th day of November, 2017 (the "Effective Date"), from TH Exploration II, LLC, a Texas limited liability company, having an address at 1320 S. University Drive, Suite 500, Fort Worth, TX 76107 (hereinafter "Assignor"), and TH Exploration, LLC, a Texas limited liability company, having an address at 1320 S. University Drive, Suite 500, Fort Worth, TX 76107 (hereinafter "Assignee").

WITNESSETH:

WHEREAS, Assignor is the owner of the right, title, and interest in those certain Oil and Gas Leases situated in Marshall County, West Virginia, which are described in Exhibit "A" and Exhibit "A-1" attached hereto and made a part hereof (hereinafter the "Leases"); and

WHEREAS, subject to the exceptions and reservations herein contained, Assignor desires to assign, set over, and transfer to Assignee all of Assignor's right, title, and interest in and to the Leases.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and subject to the limited warranties, restrictions and conditions hereinafter mentioned, the parties hereto, intending to be legally bound, do covenant and agree as follows:

1. Assignment. Assignor does hereby grant, bargain, sell, convey, deliver, assign, set over and transfer, as of the Effective Date, to Assignee, its respective successors and assigns, forever, subject to the terms, reservations, waivers and provisions as hereinafter set forth, an undivided interest of all of Assignor's right, title and interest in and to the Leases and all oil, natural gas, natural gas liquids, condensate, casinghead gas and other liquefied or gaseous hydrocarbons or products ("Hydrocarbons") thereby held, in any and all depths and formations ("Assigned Formations"), together with any and all other rights that are reasonably necessary or convenient to explore for and produce Hydrocarbons from the Assigned Formations, including, but not limited to, the right of surface access, use and occupancy, the right of ingress and egress, the right to conduct geophysical and other exploratory activities, the right to lay pipeline, the right to drill through, but not perforate or stimulate, all other depths and formations necessary for the purpose of reaching the Assigned Formations and to conduct operations therein.

TO HAVE AND TO HOLD such right, title and interest in and to the Leases unto Assignees or their designee, and their respective successors and assigns, forever, in accordance with the provisions of this Assignment.

2. Representations and Warranties. Assignor represents and warrants that such Assignor has not conveyed or otherwise encumbered its interest in the Leases since the time that Assignor obtained its interests in the Leases.

Assignor represents and warrants that, as to its interests in the Leases, Assignor has paid all royalties, overriding royalties, and other payments required by the Leases which were due for the period in which Assignor held its interests in the Leases, including, but not limited to, the interests assigned hereunder, and that Assignor has fully performed all conditions necessary to maintain the Leases in full force and effect during such period.

Assignor represents and warrants that, as to its interests in the Leases, Assignor shall not, by virtue of this Assignment or otherwise, retain any interest in the Assigned Formations, including, without limitation, any overriding royalty interest or working interest therein or with respect thereto.

3. Successors and Assigns. The terms of this Assignment shall be binding upon and inure to the benefit of the parties hereto and each of their respective successors

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06/15/2018

ASSIGNMENT AND CONVEYANCE

This Assignment and Conveyance (this "*Assignment*") is from SWN PRODUCTION COMPANY, LLC, a Texas limited liability company ("*Assignor*"), to TH Exploration, LLC, a Texas limited liability company ("*Assignee*"), and is executed on December 18, 2017 (the "*Effective Date*"). Assignor and Assignee may be referred to herein collectively as the "*Parties*," or individually as a "*Party*." Capitalized terms used herein but not otherwise defined herein (including in Section 3.7) shall have the meanings given such terms in that certain Acreage Trade Agreement between the Assignor and the Assignee dated August 24, 2017 (the "*Acreage Trade Agreement*").

**ARTICLE 1
ASSIGNMENT OF ASSETS**

Section 1.1 Assignment. For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Assignor hereby GRANTS, BARGAINS, ASSIGNS, CONVEYS AND TRANSFERS unto Assignee all of Assignor's right, title and interest in and to (i) the oil and gas leases described in more detail on Exhibit A attached hereto (the "*Leases*") INsofar AND ONLY INsofar as they cover those lands described on Exhibit A (the "*Leasehold Rights*") and (ii) any surface use agreements that relate to such Leasehold Rights (collectively with the Leasehold Rights, the "*Conveyed Assets*").

TO HAVE AND TO HOLD the Conveyed Assets, together with all and singular the rights, privileges, contracts and appurtenances, in any way appertaining or belonging thereto, unto Assignee, its successors and assigns, forever, subject, to the terms and conditions of this Assignment.

Section 1.2 Assignment Subject to Acreage Trade Agreement. This Assignment is made in accordance with and is subject to the terms, covenants and conditions contained in that certain Acreage Trade Agreement. In the event of a conflict between the provisions of the Acreage Trade Agreement and this Assignment, the provisions of the Acreage Trade Agreement shall control. The execution and delivery of this Assignment by Assignor, and the execution and acceptance of this Assignment by Assignee, shall not operate to release or impair any surviving rights or obligations of either Party with respect to the other under the Acreage Trade Agreement.

**ARTICLE 2
SPECIAL WARRANTY OF TITLE AND DISCLAIMERS**

Section 2.1 Special Warranty of Title. Assignor hereby agrees to warrant and defend Defensible Title to the Leases unto Assignee, its successors and assigns, against every Person whomsoever lawfully claiming or to claim the same or any part thereof by, through or under Assignor or any of its Affiliates, but not otherwise.

Section 2.2 Disclaimers of Warranties and Representations.

(a) EXCEPT AS EXPRESSLY REPRESENTED OTHERWISE IN SECTION VI OF THE ACREAGE TRADE AGREEMENT OR THIS ASSIGNMENT, ASSIGNOR MAKES NO, AND HEREBY EXPRESSLY DISCLAIMS, ANY REPRESENTATION OR

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ASSIGNMENT AND CONVEYANCE

This Assignment and Conveyance (this "*Assignment*") is from SWN PRODUCTION COMPANY, LLC, a Texas limited liability company ("*Assignor*"), to TH Exploration, LLC, a Texas limited liability company ("*Assignee*"), and is executed on December 18, 2017 (the "*Effective Date*"). Assignor and Assignee may be referred to herein collectively as the "*Parties*," or individually as a "*Party*." Capitalized terms used herein but not otherwise defined herein (including in Section 3.7) shall have the meanings given such terms in that certain Acreage Trade Agreement between the Assignor and the Assignee dated August 24, 2017 (the "*Acreage Trade Agreement*").

ARTICLE 1 ASSIGNMENT OF ASSETS

Section 1.1 Assignment. For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Assignor hereby GRANTS, BARGAINS, ASSIGNS, CONVEYS AND TRANSFERS unto Assignee all of Assignor's right, title and interest in and to (i) the oil and gas leases described in more detail on Exhibit A attached hereto (the "*Leases*") INsofar AND ONLY INsofar as they cover those lands described on Exhibit A (the "*Leasehold Rights*") and (ii) any surface use agreements that relate to such Leasehold Rights (collectively with the Leasehold Rights, the "*Conveyed Assets*").

TO HAVE AND TO HOLD the Conveyed Assets, together with all and singular the rights, privileges, contracts and appurtenances, in any way appertaining or belonging thereto, unto Assignee, its successors and assigns, forever, subject, to the terms and conditions of this Assignment.

Section 1.2 Assignment Subject to Acreage Trade Agreement. This Assignment is made in accordance with and is subject to the terms, covenants and conditions contained in that certain Acreage Trade Agreement. In the event of a conflict between the provisions of the Acreage Trade Agreement and this Assignment, the provisions of the Acreage Trade Agreement shall control. The execution and delivery of this Assignment by Assignor, and the execution and acceptance of this Assignment by Assignee, shall not operate to release or impair any surviving rights or obligations of either Party with respect to the other under the Acreage Trade Agreement.

ARTICLE 2 SPECIAL WARRANTY OF TITLE AND DISCLAIMERS

Section 2.1 Special Warranty of Title. Assignor hereby agrees to warrant and defend Defensible Title to the Leases unto Assignee, its successors and assigns, against every Person whomsoever lawfully claiming or to claim the same or any part thereof by, through or under Assignor or any of its Affiliates, but not otherwise.

Section 2.2 Disclaimers of Warranties and Representations.

(a) EXCEPT AS EXPRESSLY REPRESENTED OTHERWISE IN SECTION VI OF THE ACREAGE TRADE AGREEMENT OR THIS ASSIGNMENT, ASSIGNOR MAKES NO, AND HEREBY EXPRESSLY DISCLAIMS, ANY REPRESENTATION OR



TUG HILL

4705 102039

April 13, 2018

WV Department of Environmental Protection
Office of Oil & Gas
601 57th Street, SE
Charleston, WV 25304
Attention: Laura Adkins

RE: Weller 7HM

Subject: Marshall County Route 80 Road Crossing Letter

Dear Laura:

Tug Hill Operating, LLC (THO) hereby submits this letter as confirmation that THO has obtained the right to drill, extract and produce the minerals under Marshall County Route 80 in the area reflected on the Weller 7HM well plat. THO has conducted a full title search in the relevant Court House to confirm its ownership under said County Routes and is not currently aware of any recorded document that would suggest an ownership other than THO.

If your office has any questions or concerns regarding the contents of this letter, please do not hesitate to contact me directly at 304-376-0111, or by email at amiller@tug-hilop.com.

Sincerely,

Amy Miller
Permit Specialist – Appalachia Region
Cell 304-376-0111
Email: amiller@tug-hilop.com

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STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE CERTIFICATION

Date of Notice Certification: 04/13/2018

API No. 47- 051 -
Operator's Well No. Weller 7HM
Well Pad Name: Lily

Notice has been given:

Pursuant to the provisions in West Virginia Code § 22-6A, the Operator has provided the required parties with the Notice Forms listed below for the tract of land as follows:

State:	<u>West Virginia</u>	UTM NAD 83	Eastings:	<u>516,592.02</u>
County:	<u>Marshall</u>		Northing:	<u>4,398,627.68</u>
District:	<u>Franklin</u>	Public Road Access:		<u>Route 2/2</u>
Quadrangle:	<u>New Martinsville 7.5'</u>	Generally used farm name:		<u>Ula F. Nelson</u>
Watershed:	<u>French Creek (Ohio River)</u>			

Pursuant to West Virginia Code § 22-6A-7(b), every permit application filed under this section shall be on a form as may be prescribed by the secretary, shall be verified and shall contain the following information: (14) A certification from the operator that (i) it has provided the owners of the surface described in subdivisions (1), (2) and (4), subsection (b), section ten of this article, the information required by subsections (b) and (c), section sixteen of this article; (ii) that the requirement was deemed satisfied as a result of giving the surface owner notice of entry to survey pursuant to subsection (a), section ten of this article six-a; or (iii) the notice requirements of subsection (b), section sixteen of this article were waived in writing by the surface owner; and Pursuant to West Virginia Code § 22-6A-11(b), the applicant shall tender proof of and certify to the secretary that the notice requirements of section ten of this article have been completed by the applicant.

<p>Pursuant to West Virginia Code § 22-6A, the Operator has attached proof to this Notice Certification that the Operator has properly served the required parties with the following:</p> <p>*PLEASE CHECK ALL THAT APPLY</p> <p><input type="checkbox"/> 1. NOTICE OF SEISMIC ACTIVITY or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED</p> <p><input checked="" type="checkbox"/> 2. NOTICE OF ENTRY FOR PLAT SURVEY or <input type="checkbox"/> NO PLAT SURVEY WAS CONDUCTED</p> <p><input type="checkbox"/> 3. NOTICE OF INTENT TO DRILL or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NOTICE OF ENTRY FOR PLAT SURVEY WAS CONDUCTED or</p> <p style="padding-left: 100px;"><input type="checkbox"/> WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)</p> <p><input checked="" type="checkbox"/> 4. NOTICE OF PLANNED OPERATION</p> <p><input checked="" type="checkbox"/> 5. PUBLIC NOTICE</p> <p><input checked="" type="checkbox"/> 6. NOTICE OF APPLICATION</p>	<p>OOG OFFICE USE ONLY</p> <p><input type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p>
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Required Attachments:

The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication date verification or the associated Affidavit of Publication. The attached Notice Forms and Certifications of Notice shall serve as proof that the required parties have been noticed as required under West Virginia Code § 22-6A. Pursuant to West Virginia Code § 22-6A-11(b), the Certification of Notice to the person may be made by affidavit of ~~Person~~ ^{Office of Oil and Gas} the return receipt card or other postal receipt for certified mailing.

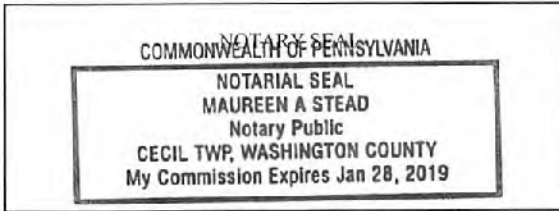
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Certification of Notice is hereby given:

THEREFORE, I Amy L. Miller *Amy L. Miller*, have read and understand the notice requirements within West Virginia Code § 22-6A. I certify that as required under West Virginia Code § 22-6A, I have served the attached copies of the Notice Forms, identified above, to the required parties through personal service, by registered mail or by any method of delivery that requires a receipt or signature confirmation. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this Notice Certification and all attachments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Well Operator:	<u>Tug Hill Operating, LLC</u>	Address:	<u>380 Southpointe Boulevard, Plaza II, Suite 200</u>
By:	<u>Amy L. Miller</u>		<u>Canonsburg, PA 15317</u>
Its:	<u>Permitting Specialist - Appalachia Region</u>	Facsimile:	<u>724-338-2030</u>
Telephone:	<u>724-749-8388</u>	Email:	<u>amiller@tug-hilltop.com</u>



Subscribed and sworn before me this 13 day of APRIL 2018
Maureen A Stead Notary Public
 My Commission Expires 1/28/19

Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

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WW-6A
(9-13)

API NO. 47-051 - 02039
OPERATOR WELL NO. Weller 7HM
Well Pad Name: Lily

**STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF APPLICATION**

47 05 102039

Notice Time Requirement: notice shall be provided no later than the filing date of permit application.

Date of Notice: 4/10/2018 Date Permit Application Filed: 4/13/2018

Notice of:

- PERMIT FOR ANY WELL WORK
- CERTIFICATE OF APPROVAL FOR THE CONSTRUCTION OF AN IMPOUNDMENT OR PIT

Delivery method pursuant to West Virginia Code § 22-6A-10(b)

- PERSONAL SERVICE
- REGISTERED MAIL
- METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to W. Va. Code § 22-6A-10(b) no later than the filing date of the application, the applicant for a permit for any well work or for a certificate of approval for the construction of an impoundment or pit as required by this article shall deliver, by personal service or by registered mail or by any method of delivery that requires a receipt or signature confirmation, copies of the application, the erosion and sediment control plan required by section seven of this article, and the well plat to each of the following persons: (1) The owners of record of the surface of the tract on which the well is or is proposed to be located; (2) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for roads or other land disturbance as described in the erosion and sediment control plan submitted pursuant to subsection (c), section seven of this article; (3) The coal owner, operator or lessee, in the event the tract of land on which the well proposed to be drilled is located [sic] is known to be underlain by one or more coal seams; (4) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for the placement, construction, enlargement, alteration, repair, removal or abandonment of any impoundment or pit as described in section nine of this article; (5) Any surface owner or water purveyor who is known to the applicant to have a water well, spring or water supply source located within one thousand five hundred feet of the center of the well pad which is used to provide water for consumption by humans or domestic animals; and (6) The operator of any natural gas storage field within which the proposed well work activity is to take place. (c)(1) If more than three tenants in common or other co-owners of interests described in subsection (b) of this section hold interests in the lands, the applicant may serve the documents required upon the person described in the records of the sheriff required to be maintained pursuant to section eight, article one, chapter eleven-a of this code. (2) Notwithstanding any provision of this article to the contrary, notice to a lien holder is not notice to a landowner, unless the lien holder is the landowner. W. Va. Code R. § 35-8-5.7.a requires, in part, that the operator shall also provide the Well Site Safety Plan ("WSSP") to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Application Notice WSSP Notice E&S Plan Notice Well Plat Notice is hereby provided to:

SURFACE OWNER(s)

Name: Ula F. Nelson
Address: 7101 W. Yale Avenue, Unit # 3703
Denver, CO 80227

Name: Carl L. Coffield, Sr. and Lana R. Coffield
Address: 970 Allendale Avenue
Akron, OH 44036

SURFACE OWNER(s) (Road and/or Other Disturbance)

Name: PPG Industries, Inc.
Address: One PPG Place
Pittsburgh, PA 15272

Name: Ula F. Nelson
Address: 7101 W. Yale Avenue, Unit # 3703
Denver, CO 80227 *See attached list

SURFACE OWNER(s) (Impoundments or Pits)

Name: _____
Address: _____

COAL OWNER OR LESSEE

Name: PPG Industries, Inc.
Address: One PPG Place
Pittsburgh, PA 15272 *See attached list

COAL OPERATOR

Name: _____
Address: _____

SURFACE OWNER OF WATER WELL AND/OR WATER PURVEYOR(s)

Name: Ula F. Nelson
Address: 7101 W. Yale Avenue, Unit #3703
Denver, CO 80227

OPERATOR OF ANY NATURAL GAS STORAGE FIELD

Name: _____
Address: _____

*Please attach additional forms if necessary

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Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-10(b), notice is hereby given that the undersigned well operator has applied for a permit for well work or for a certificate of approval for the construction of an impoundment or pit.

This Notice Shall Include:

Pursuant to W. Va. Code § 22-6A-10(b), this notice shall include: (1) copies of the application; (2) the erosion and sediment control plan required by section seven of this article; and (3) the well plat.

Pursuant to W. Va. Code § 22-6A-10(f), this notice shall include: (1) a statement of the time limits for filing written comments; (2) who may file written comments; (3) the name and address of the secretary for the purpose of filing the comments and obtaining additional information; and (4) a statement that the persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

Pursuant to W. Va. Code R. § 35-8-5.7.a, the operator shall provide the Well Site Safety Plan to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Pursuant to W. Va. Code R. § 35-8-15.2.c, this notice shall: (1) contain a statement of the surface owner's and water purveyor's right to request sampling and analysis; (2) advise the surface owner and water purveyor of the rebuttable presumption for contamination or deprivation of a fresh water source or supply; advise the surface owner and water purveyor that refusal to allow the operator to conduct a pre-drilling water well test constitutes a method to rebut the presumption of liability; (3) advise the surface owner and water purveyor of his or her independent right to sample and analyze any water supply at his or her own expense; advise the surface owner and water purveyor whether or not the operator will utilize an independent laboratory to analyze any sample; and (4) advise the surface owner and or water purveyor that he or she can obtain from the Chief a list of water testing laboratories in the subject area capable of and qualified to test water supplies in accordance with standard acceptable methods.

Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

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Well Location Restrictions

Pursuant to W. Va. Code § 22-6A-12, Wells may not be drilled within two hundred fifty feet measured horizontally from any existing water well or developed spring used for human or domestic animal consumption. The center of well pads may not be located within six hundred twenty-five feet of an occupied dwelling structure, or a building two thousand five hundred square feet or larger used to house or shelter dairy cattle or poultry husbandry. This limitation is applicable to those wells, developed springs, dwellings or agricultural buildings that existed on the date a notice to the surface owner of planned entry for surveying or staking as provided in section ten of this article or a notice of intent to drill a horizontal well as provided in subsection (b), section sixteen of this article was provided, whichever occurs first, and to any dwelling under construction prior to that date. This limitation may be waived by written consent of the surface owner transmitted to the department and recorded in the real property records maintained by the clerk of the county commission for the county in which such property is located. Furthermore, the well operator may be granted a variance by the secretary from these distance restrictions upon submission of a plan which identifies the sufficient measures, facilities or practices to be employed during well site construction, drilling and operations. The variance, if granted, shall include terms and conditions the department requires to ensure the safety and protection of affected persons and property. The terms and conditions may include insurance, bonding and indemnification, as well as technical requirements. (b) No well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream, natural or artificial lake, pond or reservoir, or a wetland, or within three hundred feet of a naturally reproducing trout stream. No well pad may be located within one thousand feet of a surface or ground water intake of a public water supply. The distance from the public water supply as identified by the department shall be measured as follows: (1) For a surface water intake on a lake or reservoir, the distance shall be measured from the boundary of the lake or reservoir. (2) For a surface water intake on a flowing stream, the distance shall be measured from a semicircular radius extending upstream of the surface water intake. (3) For a groundwater source, the distance shall be measured from the wellhead or spring. The department may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. A waiver, if granted, shall impose any permit conditions as the secretary considers necessary. (c) Notwithstanding the foregoing provisions of this section, nothing contained in this section prevents an operator from conducting the activities permitted or authorized by a Clean Water Act Section 404 permit or other approval from the United States Army Corps of Engineers within any waters of the state or within the restricted areas referenced in this section. (d) The well location restrictions set forth in this section shall not apply to any well on a multiple well pad if at least one of the wells was permitted prior to the effective date of this article. (e) The secretary shall, by December 31, 2012, report to the Legislature on the noise, light, dust and volatile organic compounds generated by the drilling of horizontal wells as they relate to the well location restrictions regarding occupied dwelling structures pursuant to this section. Upon a finding, if any, by the secretary that the well location restrictions regarding occupied dwelling structures are inadequate or otherwise require alteration to address the items

WV Department of
Environmental Protection

WW-6A
(8-13)

API NO. 47- 051-02039
OPERATOR WELL NO. Weller 7HM
Well Pad Name: Lily

examined in the study required by this subsection, the secretary shall have the authority to propose for promulgation legislative rules establishing guidelines and procedures regarding reasonable levels of noise, light, dust and volatile organic compounds relating to drilling horizontal wells, including reasonable means of mitigating such factors, if necessary.

Water Well Testing:

Pursuant to West Virginia Code § 22-6A-10(d), notification shall be made, with respect to surface landowners identified in subsection (b) or water purveyors identified in subdivision (5), subsection (b) of this section, of the opportunity for testing their water well. The operator shall provide an analysis to such surface landowner or water purveyor at their request.

Water Testing Laboratories:

Pursuant to West Virginia Code § 22-6A-10(i), persons entitled to notice pursuant to subsection (b) of this section may contact the department to ascertain the names and locations of water testing laboratories in the subject area capable and qualified to test water supplies in accordance with standard accepted methods. In compiling that list of names the department shall consult with the state Bureau for Public Health and local health departments. A surface owner and water purveyor has an independent right to sample and analyze any water supply at his or her own expense. The laboratory utilized by the operator shall be approved by the agency as being certified and capable of performing sample analyses in accordance with this section.

Rebuttable Presumption for Contamination or Deprivation of a Fresh Water Source or Supply:

W. Va. Code § 22-6A-18 requires that (b) unless rebutted by one of the defenses established in subsection (c) of this section, in any action for contamination or deprivation of a fresh water source or supply within one thousand five hundred feet of the center of the well pad for horizontal well, there is a rebuttable presumption that the drilling and the oil or gas well or either was the proximate cause of the contamination or deprivation of the fresh water source or supply. (c) In order to rebut the presumption of liability established in subsection (b) of this section, the operator must prove by a preponderance of the evidence one of the following defenses: (1) The pollution existed prior to the drilling or alteration activity as determined by a predrilling or prealteration water well test. (2) The landowner or water purveyor refused to allow the operator access to the property to conduct a predrilling or prealteration water well test. (3) The water supply is not within one thousand five hundred feet of the well. (4) The pollution occurred more than six months after completion of drilling or alteration activities. (5) The pollution occurred as the result of some cause other than the drilling or alteration activity. (d) Any operator electing to preserve its defenses under subdivision (1), subsection (c) of this section shall retain the services of an independent certified laboratory to conduct the predrilling or prealteration water well test. A copy of the results of the test shall be submitted to the department and the surface owner or water purveyor in a manner prescribed by the secretary. (e) Any operator shall replace the water supply of an owner of interest in real property who obtains all or part of that owner's supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source with a comparable water supply where the secretary determines that the water supply has been affected by contamination, diminution or interruption proximately caused by the oil or gas operation, unless waived in writing by that owner. (f) The secretary may order the operator conducting the oil or gas operation to: (1) Provide an emergency drinking water supply within twenty-four hours; (2) Provide temporary water supply within seventy-two hours; (3) Within thirty days begin activities to establish a permanent water supply or submit a proposal to the secretary outlining the measures and timetables to be used in establishing a permanent supply. The total time in providing a permanent water supply may not exceed two years. If the operator demonstrates that providing a permanent replacement water supply cannot be completed within two years, the secretary may extend the time frame on case-by-case basis; and (4) Pay all reasonable costs incurred by the real property owner in securing a water supply. (g) A person as described in subsection (b) of this section aggrieved under the provisions of subsections (b), (e) or (f) of this section may seek relief in court... (i) Notwithstanding the denial of the operator of responsibility for the damage to the real property owner's water supply or the status of any appeal on determination of liability for the damage to the real property owner's water supply, the operator may not discontinue providing the required water service until authorized to do so by the secretary or a court of competent jurisdiction.

Written Comment:

Pursuant to West Virginia Code § 22-6A-11(a), all persons described in subsection (b), section ten of this article may file written comments with the secretary as to the location or construction of the applicant's proposed well work within thirty days after the application is filed with the secretary. All persons described in West Virginia Code § 22-6A-10(b) may file written comments to the location or construction of the applicant's proposed well work to the Secretary at:

Chief, Office of Oil and Gas
Department of Environmental Protection
601 57th St. SE
Charleston, WV 25304
(304) 926-0450

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Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water. **NOTE: YOU ARE NOT REQUIRED TO FILE ANY COMMENT.**

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Time Limits and Methods for Filing Comments.

The law requires these materials to be served on or before the date the operator files its Application. You have **THIRTY (30) DAYS** after the filing date to file your comments. Comments must be filed in person or received in the mail by the Chief's office by the time stated above. You may call the Chief's office to be sure of the date. Check with your postmaster to ensure adequate delivery time or to arrange special expedited handling. If you have been contacted by the well operator and you have signed a "voluntary statement of no objection" to the planned work described in these materials, then the permit may be issued at any time.

Pursuant to West Virginia Code § 22-6A-11(c)(2), Any objections of the affected coal operators and coal seam owners and lessees shall be addressed through the processes and procedures that exist under sections fifteen, seventeen and forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article. The written comments filed by the parties entitled to notice under subdivisions (1), (2), (4), (5) and (6), subsection (b), section ten of this article shall be considered by the secretary in the permit issuance process, but the parties are not entitled to participate in the processes and proceedings that exist under sections fifteen, seventeen or forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article.

Comment Requirements

Your comments must be in writing and include your name, address and telephone number, the well operator's name and well number and the approximate location of the proposed well site including district and county from the application. You may add other documents, such as sketches, maps or photographs to support your comments.

Disclaimer: All comments received will be placed on our web site <http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/Pages/default.aspx> and the applicant will automatically be forwarded an email notice that such comments have been submitted. The applicant will be expected to provide a response to comments submitted by any surface owner, water purveyor or natural gas storage operator noticed within the application.

Permit Denial or Condition

The Chief has the power to deny or condition a well work permit. Pursuant to West Virginia Code § 22-6A-8(d), the permit may not be issued or be conditioned, including conditions with respect to the location of the well and access roads prior to issuance if the director determines that:

- (1) The proposed well work will constitute a hazard to the safety of persons;
- (2) The plan for soil erosion and sediment control is not adequate or effective;
- (3) Damage would occur to publicly owned lands or resources; or
- (4) The proposed well work fails to protect fresh water sources or supplies.

A permit may also be denied under West Virginia Code § 22-6A-7(k), the secretary shall deny the issuance of a permit if the secretary determines that the applicant has committed a substantial violation of a previously issued permit for a horizontal well, including the applicable erosion and sediment control plan associated with the previously issued permit, or a substantial violation of one or more of the rules promulgated under this article, and in each instance has failed to abate or seek review of the violation within the time prescribed by the secretary pursuant to the provisions of subdivisions (1) and (2), subsection (a), section five of this article and the rules promulgated hereunder, which time may not be unreasonable.

Pursuant to West Virginia Code § 22-6A-10(g), any person entitled to submit written comments to the secretary pursuant to subsection (a), section eleven of this article, shall also be entitled to receive from the secretary a copy of the permit as issued or a copy of the order modifying or denying the permit if the person requests receipt of them as a part of the written comments submitted concerning the permit application. Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

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WW-6A
(8-13)

API NO. 47- 051 - 02039
OPERATOR WELL NO. Weller 7HM
Well Pad Name: Lily

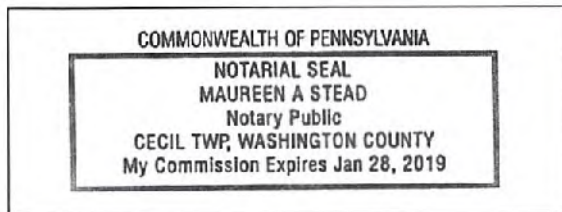
Notice is hereby given by:

Well Operator: Tug Hill Operating, LLC
Telephone: 724-749-6388
Email: amiller@tug-hill-op.com *Amy Miller*

Address: 380 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317
Facsimile: 724-338-2030

Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.



Subscribed and sworn before me this 10 day of APRIL 2018.

Maureen A Stead Notary Public

My Commission Expires 1/28/19

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47 051 02039

WW-6A Notice of Application Attachment

Weller 7HM

Surface Owner(s) Access Road

PPG Industries, LLC
One PPG Place
Pittsburgh, PA 15272

Coal Owner or Lessee (Well Pad)

Appalachian Power Company
P.O. Box 16428
Columbus, OH 43216-6428

Betty Knowles
1230 Elm Street
Mountain Home, ID 83647

William L. Litman
15 Linden Avenue
Wheeling, WV 26003

Vicki Lynn Wood
1204 Center Street
Moundsville, WV 26041

Aaron D. Litman
67 Olive Street
Moundsville, WV 26041

Klova Morris
1681 Rivermont Road
Columbus, OH 43223

Reva Junne Icard
319 7th Street
Moundsville, WV 26041

Professional Land Resources, LLC
P.O. Box 965
Dellslow, WV 26531

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WW-6A

Supplement Pg. 1A

Tug Hill Operating, LLC
380 Southpointe BLVD, Suite 200
Canonsburg, PA 15317

WATER WELL REPORT

Well: WELLER No. 7HM
District: Franklin
County: Marshall
State: WV

There appears to be one (1) possible water source within 2,000 feet of the above referenced well location.

Topo spot #1 TM 28 Par.6 Ula F. Nelson 303-502-7711(C) 7101 W. Yale Ave. Unit #3703 Denver, CO 80227		
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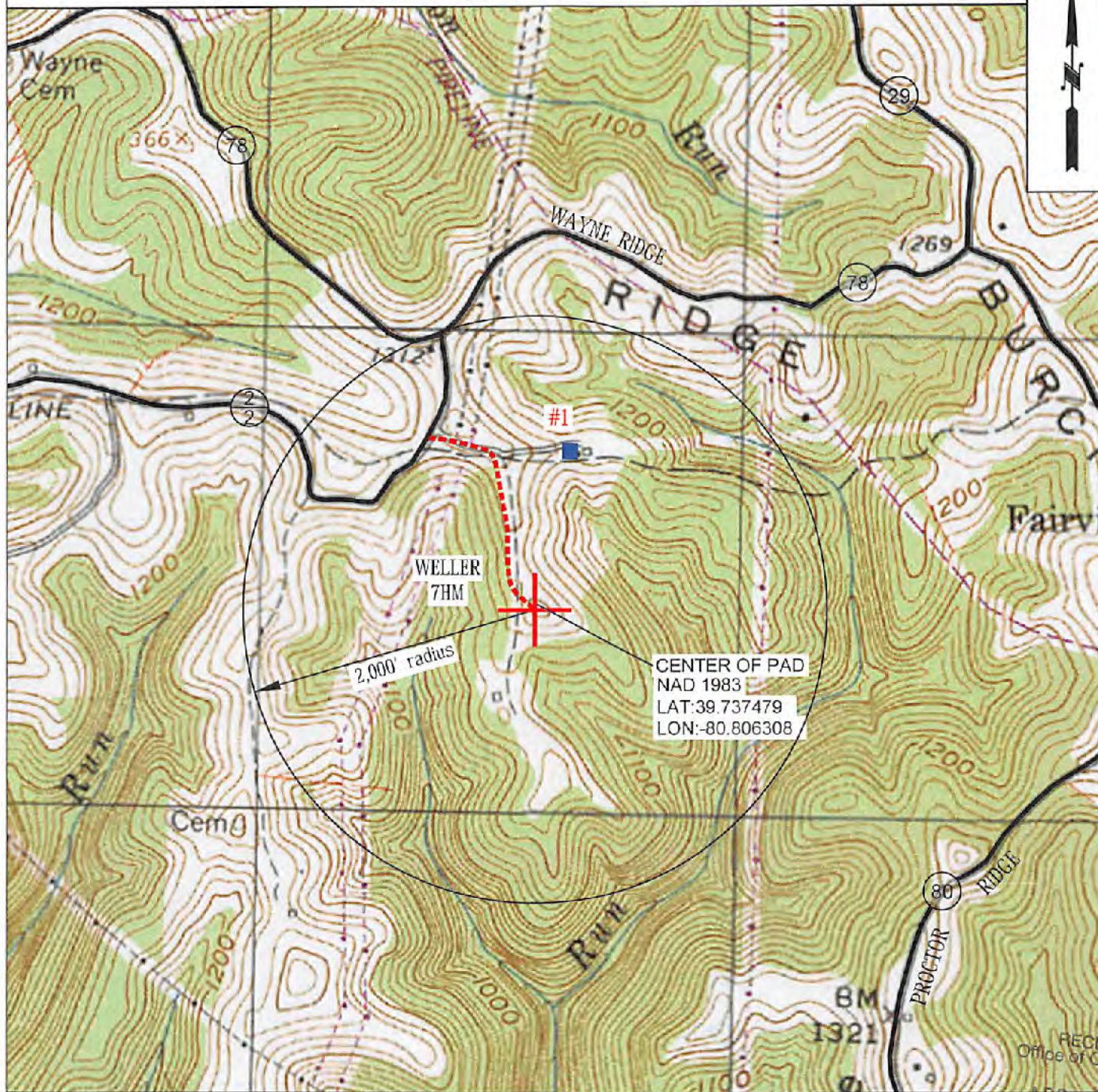
06/15/2018

WW-6A

PROPOSED WELLER 7HM

SUPPLEMENT PG 1

There appears to be One (1) possible water sources within 2,000'.



CENTER OF PAD
NAD 1983
LAT:39.737479
LON:-80.806308

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OPERATOR 494510851
TUG HILL OPERATING, LLC
380 SOUTHPOINTE BLVD
SUITE 200
CANONSBURG, PA 15317

TOPO SECTION
NEW MARTINSVILLE 7.5'
SCALE:
1" = 1000'

LEASE NAME
WELLER
DATE:
DATE: 01/16/2018

WV Department of Environmental Protection

06/15/2018

47051 02039

**STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF ENTRY FOR PLAT SURVEY**

Notice Time Requirement: Notice shall be provided at least SEVEN (7) days but no more than FORTY-FIVE (45) days prior to entry

Date of Notice: 12/5/2017 **Date of Planned Entry:** 12/12/2017

Delivery method pursuant to West Virginia Code § 22-6A-10a

- PERSONAL SERVICE
 REGISTERED MAIL
 METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to West Virginia Code § 22-6A-10(a), Prior to filing a permit application, the operator shall provide notice of planned entry on to the surface tract to conduct any plat surveys required pursuant to this article. Such notice shall be provided at least seven days but no more than forty-five days prior to such entry to: (1) The surface owner of such tract; (2) to any owner or lessee of coal seams beneath such tract that has filed a declaration pursuant to section thirty-six, article six, chapter twenty-two of this code; and (3) any owner of minerals underlying such tract in the county tax records. The notice shall include a statement that copies of the state Erosion and Sediment Control Manual and the statutes and rules related to oil and gas exploration and production may be obtained from the Secretary, which statement shall include contact information, including the address for a web page on the Secretary's web site, to enable the surface owner to obtain copies from the secretary.

Notice is hereby provided to:

SURFACE OWNER(s)

Name: Ula F. Nelson (Pad and Access Road)
Address: P.O. Box 27439
Denver, CO 80227

Name: Carl L. Coffield, Sr. and Lana R. Coffield (Pad and Access Road)
Address: 970 Allendale Avenue
Akron, OH 44036

Name: PPG Industries, Inc. (Access Road)
Address: One PPG Place
Pittsburgh, PA 15272

COAL OWNER OR LESSEE

Name: *See attached list
Address: _____

MINERAL OWNER(s)

Name: *See attached list
Address: _____

*please attach additional forms if necessary

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-10(a), notice is hereby given that the undersigned well operator is planning entry to conduct a plat survey on the tract of land as follows:

State: <u>West Virginia</u>	Approx. Latitude & Longitude: <u>39.7374506; -80.8064532</u>
County: <u>Marshall</u>	Public Road Access: <u>Wells Hill Road - County Route 2/2</u>
District: <u>Franklin</u>	Watershed: <u>HUC-10: French Creek - Ohio River</u>
Quadrangle: <u>New Martinsville 7.5'</u>	Generally used farm name: <u>Nelson, Ula F.</u>

Copies of the state Erosion and Sediment Control Manual and the statutes and rules related to oil and gas exploration and production may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450). Copies of such documents or additional information related to horizontal drilling may be obtained from the Secretary by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Notice is hereby given by:

Well Operator: Tug Hill Operating, LLC
Telephone: 724-749-8388
Email: amiller@tug-hill.com

Address: 380 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317
Facsimile: 724-338-2030

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Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

06/15/2018

47051 02039

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF ENTRY FOR PLAT SURVEY

Notice Time Requirement: Notice shall be provided at least SEVEN (7) days but no more than FORTY-FIVE (45) days prior to entry

Date of Notice: 12/19/2017 **Date of Planned Entry:** 12/28/2017

Delivery method pursuant to West Virginia Code § 22-6A-10a

- PERSONAL SERVICE
- REGISTERED MAIL
- METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to West Virginia Code § 22-6A-10(a), Prior to filing a permit application, the operator shall provide notice of planned entry on to the surface tract to conduct any plat surveys required pursuant to this article. Such notice shall be provided at least seven days but no more than forty-five days prior to such entry to: (1) The surface owner of such tract; (2) to any owner or lessee of coal seams beneath such tract that has filed a declaration pursuant to section thirty-six, article six, chapter twenty-two of this code; and (3) any owner of minerals underlying such tract in the county tax records. The notice shall include a statement that copies of the state Erosion and Sediment Control Manual and the statutes and rules related to oil and gas exploration and production may be obtained from the Secretary, which statement shall include contact information, including the address for a web page on the Secretary's web site, to enable the surface owner to obtain copies from the secretary.

Notice is hereby provided to:

SURFACE OWNER(s)

Name: Ula F. Nelson (Pad and Access Road)
 Address: P.O. Box 27439
Denver, CO 80227

Name: Carl L. Coffield, Sr. and Lana R. Coffield (Pad and Access Road)
 Address: 970 Allendale Avenue
Akron, OH 44036

Name: PPG Industries, Inc. (Access Road)
 Address: One PPG Place
Pittsburgh, PA 15272

COAL OWNER OR LESSEE

Name: *See attached list
Address: _____

MINERAL OWNER(s)

Name: *See attached list
Address: _____

**please attach additional forms if necessary*

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-10(a), notice is hereby given that the undersigned well operator is planning entry to conduct a plat survey on the tract of land as follows:

State: <u>West Virginia</u>	Approx. Latitude & Longitude: <u>39.7374506; -80.8064532</u>
County: <u>Marshall</u>	Public Road Access: <u>Wells Hill Road - County Route 2/2</u>
District: <u>Franklin</u>	Watershed: <u>HUC-10: French Creek - Ohio River</u>
Quadrangle: <u>New Martinsville 7.5'</u>	Generally used farm name: <u>Nelson, Ula F.</u>

Copies of the state Erosion and Sediment Control Manual and the statutes and rules related to oil and gas exploration and production may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450). Copies of such documents or additional information related to horizontal drilling may be obtained from the Secretary by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Notice is hereby given by:

Well Operator: Tug Hill Operating, LLC
Telephone: 724-749-8388
Email: amiller@tug-hillop.com

Address: 360 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317
Facsimile: 724-338-2030

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Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

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WW-6A3 Attachment**Weller 7HM****Mineral Owner (s) Well Pad**

Ula F. Nelson
 P.O. Box 27439
 Denver, CO 80227

Aaron D. Litman
 67 Olive Street
 Moundsville, WV 26041

Betty Knowles
 1230 Elm Street
 Mountain Home, ID 83647

Reva June Icard
 379 7th Street
 Moundsville, WV 26041

William L. Litman
 15 Linden Avenue
 Wheeling, WV 26003

Klova Ann Morris
 1681 Rivermont Road
 Columbus, OH 43223

Vicki Lynn Wood
 1204 Center Street
 Moundsville, WV 26041

Professional Land Resources, LLC
 P.O. Box 965
 Dellslow, WV 26531

Coal Owner or Lessee(s) Well Pad

Appalachian Power Company
 P.O. Box 16428
 Columbus, OH 43216-6428

Aaron D. Litman
 67 Olive Street
 Moundsville, WV 26041

Ula F. Nelson
 P.O. Box 27439
 Denver, CO 80227

Reva June Icard
 379 7th Street
 Moundsville, WV 26041

Betty Knowles
 1230 Elm Street
 Mountain Home, ID 83647

Klova Ann Morris
 1581 Wyandotte Road
 Columbus, OH 43212

William L. Litman
 15 Linden Avenue
 Wheeling, WV 26003

Professional Land Resources, LLC
 P.O. Box 965
 Dellslow, WV 26531

Vicki Lynn Wood
 1204 Center Street
 Moundsville, WV 26041

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**STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF PLANNED OPERATION**

Notice Time Requirement: notice shall be provided no later than the **filing date of permit application.**

Date of Notice: 04/10/2018 **Date Permit Application Filed:** 04/13/2018

Delivery method pursuant to West Virginia Code § 22-6A-16(c)

- CERTIFIED MAIL HAND
RETURN RECEIPT REQUESTED DELIVERY

Pursuant to W. Va. Code § 22-6A-16(c), no later than the date for filing the permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner whose land will be used for the drilling of a horizontal well notice of the planned operation. The notice required by this subsection shall include: (1) A copy of this code section; (2) The information required to be provided by subsection (b), section ten of this article to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. (d) The notices required by this section shall be given to the surface owner at the address listed in the records of the sheriff at the time of notice.

Notice is hereby provided to the SURFACE OWNER(s)
(at the address listed in the records of the sheriff at the time of notice):

Name: Ula F. Nelson
Address: 7101 Yale Avenue, Unit # 3703
Denver, CO 80227

Name: Carl L. Coffield, Sr. and Lana R. Coffield
Address: 970 Allendale Avenue
Akron, OH 44335

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-16(c), notice is hereby given that the undersigned well operator has developed a planned operation on the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State:	<u>West Virginia</u>	UTM NAD 83	Easting:	<u>516,592.02</u>
County:	<u>Marshall</u>		Northing:	<u>4,398,627.68</u>
District:	<u>Franklin</u>	Public Road Access:	<u>Route 2/2</u>	
Quadrangle:	<u>New Martinsville 7.5'</u>	Generally used farm name:	<u>Ula F. Nelson</u>	
Watershed:	<u>Fish Creek (Ohio River)</u>			

This Notice Shall Include:

Pursuant to West Virginia Code § 22-6A-16(c), this notice shall include: (1) A copy of this code section; (2) The information required to be provided by **W. Va. Code § 22-6A-10(b)** to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Well Operator: Tug Hill Operating, LLC
Telephone: 724-749-8388
Email: amiller@tug-hilltop.com

Address: 390 Southpointe Boulevard, Plaza II, Suite 300
Canonsburg, PA 15317
Facsimile: 724-338-2030

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47 05 102039

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
Division of Highways

1900 Kanawha Boulevard East • Building Five • Room 110
Charleston, West Virginia 25305-0430 • (304) 558-3505

Jim Justice
Governor

Thomas J. Smith, P. E.
Secretary of Transportation/
Commissioner of Highways

December 7, 2017

James A. Martin, Chief
Office of Oil and Gas
Department of Environmental Protection
601 57th Street, SE
Charleston, WV 25304

Subject: DOH Permits for the Lily Well Pad, Marshall County

Weller 7HM Well Site

Dear Mr. Martin,

This well site will be accessed from Permit #06-2012-0131 transferred to Tug Hill Operating for access to the State Road for a well site located off of Marshall County Route 2/2 SLS.

The operator has signed a DISTRICT WIDE OIL AND GAS ROAD MAINTENANCE BONDING AGREEMENT and provided the required Bond. This operator is currently in compliance with the DOH OIL AND GAS POLICY dated January 3, 2012.

Very Truly Yours,

Gary K. Clayton, P.E.
Regional Maintenance Engineer
Central Office O&G Coordinator

Cc: Jonathan White
Tug Hill Operating
CH, OM, D-6
File

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06/15/2018



TUG HILL 47 05 102039

PLANNED ADDITIVES TO BE USED IN FRACTURING OR STIMULATION

Well No. Weller 7HM

PRODUCT NAME:	CHEMICAL DESCRIPTION:	PRODUCT USE:	HAZARDOUS COMPONENT:
GBW-20C	Hemicellulase Breaker	Breaker - Water	None
ALPHA 1427		Biocide	Glutaraldehyde – CAS#000111-30-8 Quaternary ammonium chloride CAS# 007173-51-5 Alky dimethyl benzyl ammonium Chloride (C12-16) – CAS#068424-85-1 Ethanol – CAS# 000064-17-5 Water – CAS# 007732-18-5
FRAC SAND	Silica Sand (various Mesh sizes)	Proppant	Crystalline silica (quartz) CAS# 14808-60-7
S-8C, Sand	Silica Sand (100 mesh)	Sand	Silica – CAS# 14808-60-7
GW-3LDF		Gellant - Water	Petroleum Distillate Blend – Proprietary, (Not Associated with Diesel Fuel) Guar gum – CAS# 009000-30-0
FRW-18		Friction Reducer	Hydrotreated light distillate CAS# 064742-47-8
Scaletrol		Scale Inhibitor	Ethylene glycol – CAS# 000107-21-1 Diethylene glycol – CAS# 000111-46-6

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Environmental Protection

4705 102039

Lily

Site Design, C
Erosion and Se
Tug H
Mars
Frankl
Latitude
Longitude
Haynes Run - C

**WVDEP 00G
ACCEPTED AS-BUILT**

[Signature]
3/19/2018

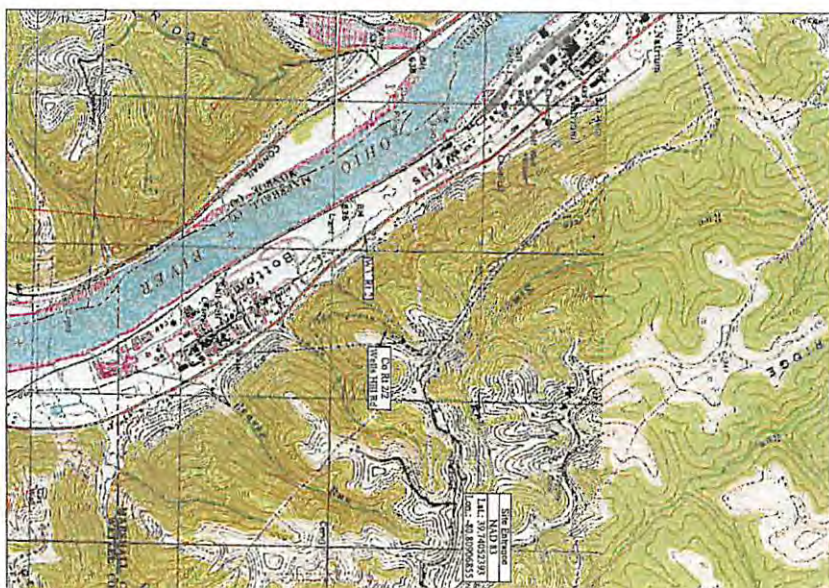
Exhibit A: Final Dess



Site Easement	Center of Well Pad
WV-N-ND 81-N-430418-09 WV-N-ND 81-N-430419-09 WV-N-ND 27-N-464843-03 WV-N-ND 27-N-16318143-05 LEA-ND 81-N-3974062195 LEA-ND 81-N-3974062195 LEA-ND 27-N-3974062195 LEA-ND 27-N-3974062195 UTM-17-ND 81-N-43097543-59 UTM-17-ND 81-N-51059319	WV-N-ND 81-N-433311-00 WV-N-ND 27-N-433444-04 WV-N-ND 27-N-16359013 LEA-ND 81-N-3974062195 LEA-ND 27-N-3974062195 LEA-ND 27-N-3974062195 LEA-ND 27-N-3974062195 UTM-17-ND 81-N-43385514 UTM-17-ND 81-N-51059319 LEA-ND 81-N-3974062195



LEA-III	LEA-2/E	Well #14-N	LEA-III	LEA-III
WV-N-ND 81-N-430411-09 WV-N-ND 81-N-430412-09 WV-N-ND 81-N-430413-09 WV-N-ND 27-N-16329111-03 LEA-ND 81-N-3974062195 LEA-ND 81-N-3974062195 LEA-ND 27-N-3974062195 LEA-ND 27-N-3974062195 UTM-17-ND 81-N-43097543-59 UTM-17-ND 81-N-51059319	WV-N-ND 81-N-433941-11 WV-N-ND 81-N-433942-11 WV-N-ND 81-N-433943-11 WV-N-ND 27-N-16329111-03 LEA-ND 81-N-3974062195 LEA-ND 81-N-3974062195 LEA-ND 27-N-3974062195 LEA-ND 27-N-3974062195 UTM-17-ND 81-N-433922-23 UTM-17-ND 81-N-51059319	WV-N-ND 81-N-43318-23 WV-N-ND 81-N-43318-23 WV-N-ND 81-N-43318-23 WV-N-ND 27-N-16329111-03 LEA-ND 81-N-3974062195 LEA-ND 81-N-3974062195 LEA-ND 27-N-3974062195 LEA-ND 27-N-3974062195 UTM-17-ND 81-N-433922-23 UTM-17-ND 81-N-51059319	WV-N-ND 81-N-43318-41 WV-N-ND 81-N-43318-41 WV-N-ND 27-N-16329111-03 LEA-ND 81-N-3974062195 LEA-ND 81-N-3974062195 LEA-ND 27-N-3974062195 LEA-ND 27-N-3974062195 UTM-17-ND 81-N-433922-23 UTM-17-ND 81-N-51059319	WV-N-ND 81-N-43340-09 WV-N-ND 81-N-43340-09 WV-N-ND 27-N-16329111-03 LEA-ND 81-N-3974062195 LEA-ND 81-N-3974062195 LEA-ND 27-N-3974062195 LEA-ND 27-N-3974062195 UTM-17-ND 81-N-433922-23 UTM-17-ND 81-N-51059319



Site Locations (NAD 27)	
Station	Latitude (DD)
Center of Well Pad	39.713559
	-80.853107



From the intersection of OH Rt 7 and WV Rt 2 near New Martinsville, WV, Travel North on WV Rt 2 for 6.1 mi, Turn Right onto Co Rt 22 (Wells Hill Rd). Follow Co Rt 22 for 2.3 mi. The site entrance will be on the Right (East) side of the road.

Approach Route:

Well Location Restrictions

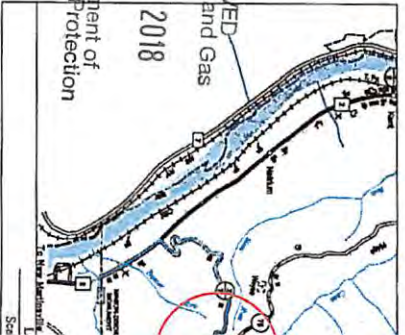
- All Pad construction complies with the following restrictions.
- *25' from an existing well or developed spring used for human or domestic animals.
- *42' from an occupied dwelling or less than 2,500 SF used for poultry or dairy increased from the center of the pad.
- *20' from the edge of easements to a sanitary reproduction from streams.
- *1,000' of a surface or ground water intake to a public water supply.

Well Location Restrictions of WV Code 26-6-1.13

The WV Mines Website was consulted. Previous (Current) mining activities are not within the AOI.

WVDEP Website files show that there are active and/or abandoned gas wells within the AOI

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Office of Oil and Gas
APR 17 2018



Fiscoplanner Conditional VIL/Ordinal Protection	
Do site construction activities take place at a floodplain:	NO
Permit needed from county Fiscoplanner coordinator:	NO
Flood Hazard Zone:	X
Flood Hazard Zone:	X
Fiscoplanner shows no driveway:	N/A
Fiscoplanner shows no driveway:	N/A
Fiscoplanner shows no driveway:	N/A
Address of construction in floodplain:	N/A

Project Contacts

Top Hill Operating Jordan White - Regulatory Advisor 724-443-0800 OIC 504-463-9175 Cell 504-463-2539 OIC	Survey and Engineer Ernesta Edly 304-313-6883 OIC
Center John P. Lee 304-443-2520 OIC	Architect/Geotechnical American Geotech. Inc. 304-318-4377 OIC

Top Hill Operating, LLC
280 Springdale Blvd
PO Box 200
Canaan, VA 25117

Architect/Geotechnical
American Geotech. Inc.
104-186-4377 OIC

Estimate/Valuation:
Wetland Determination as provided by Altizer Ecology
dated December 5, 2017

Transportation Information:
The property is located along Route 724, 6.1 miles south of the aerial photograph by Blue Mountain Aerial Mapping, Bureau, WV

811
Keyed below:
Call before you dig.

MRS UTILITY OF WEST VIRGINIA
1-800-245-4848
WEA100@wvonline.com
800 W. VIRGINIA ST. STE. 100
MARTINSVILLE, WV 26151
WWW.811.WV.GOV

Well Site
 Construction Plan, &
 Erosion Control Plans
 Operating
 Marshall County
 Franklin District
 39.73743325°
 80.80632501°
 Ohio River Watershed

Issue for Permitting

Pertinent Site Information
 Lily Well Site
 Emergency Number: 304-845-1920
 Franklin District, Marshall County, WV
 Watershed: Haynes Run - Ohio River Watershed
 Tug Hill Contact Number: 1-817-632-3400

Property Owner Information - Lily Well Site
 Franklin District - Marshall County

Owner	Y1-C	Y2-C	Y3-C	Y4-C	Y5-C	Y6-C	Y7-C	Y8-C	Y9-C	Y10-C
WV Federal Use	31.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
US Nation	24.4	4.96	0.31	0.75	0.60	1.34	0.25	0.00	0.25	0.00
Site Road(s)	4.96	0.31	1.31	0.60	0.60	3.74				11.08

Access Road

Soil/Owner	Yd - Feet	Road Length	Type
WV Dist/Owner Use	31.4	4817.1'	New Access Road Construction
US Nation	24.4	1170.2'	New Access Road Construction

WV State Plane Coordinate System
 NAD 83
 Zone 18
 Established by State Order 075
 and OTCUS Post-Processing

Disturbed Area

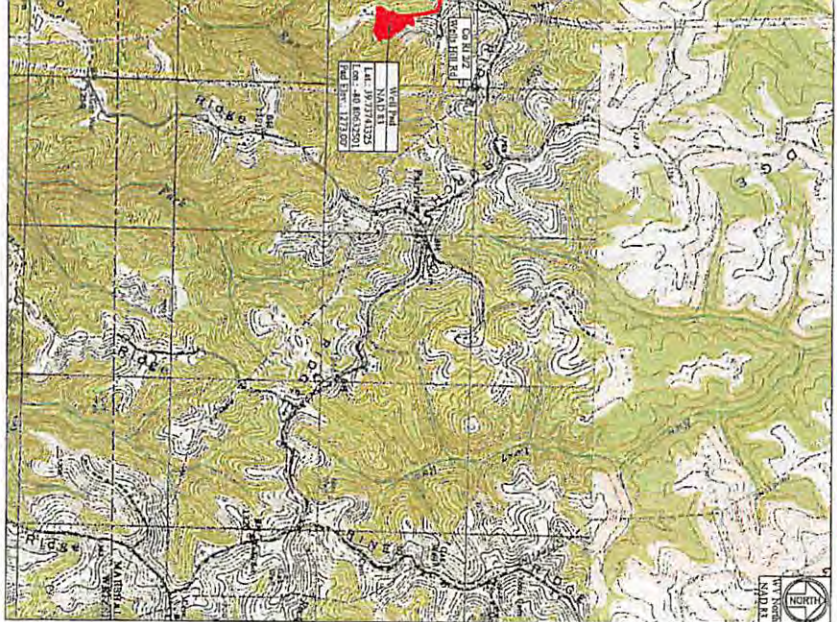
Well Pad Construction	4.96 AC
Access Road Construction	1.34 AC
Utility Line	0.31 AC
Heavy Area	0.75 AC
Topsoil Excavation	0.60 AC
Total Disturbed Area	11.08 AC

Additional Information
 Total Wooded Area Disturbed 3.00 AC
 Total Linear Feet of Access Road 13072.6'

Note:
 All disturbances will take place within the existing Limits of Disturbance for the Lily Well Site. No additional clearing/disturbance will take place outside of the existing LOD. Additional erosion and sedimentation controls will be installed within the LOD. All earthwork/disturbance shall take place within the existing LOD. The existing access road to the site shall be used and no additional access roads will be necessary for the site modifications.

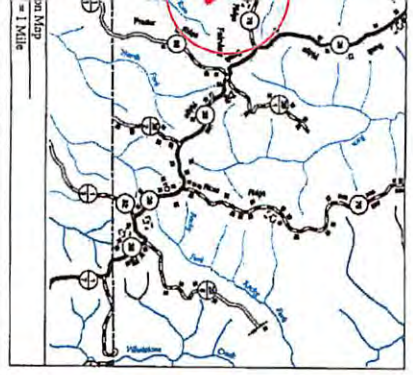
Lily Well Site Quantities

Description	Cut (CY)	Fill (CY)	Spill (CY)	Import (CY)	Export (CY)	Area (Sq Ft)	Length of Slope
Well Pad Area	21.9	1,800.41	1,800.31	N/A	N/A	N/A	N/A
Well Pad Access Road MS	2.31	137.53	130.31	14,185	17,297	17,297	
Landowner Access Road MS	0.30	211.19	207.89	15,006	12,529	12,529	
Gravel	2,507.12	2,287.12	2,500.01	N/A	N/A	N/A	N/A
Total Spill (CY) =	238.60	2281.41	2281.41				



Site Locations (NAD 83)

Structure	Latitude (D2)	Longitude (D2)
Well Pad	39.73743325	-80.80632501
Center of Well Pad	39.73743325	-80.80632501



Design Conditions

The drawings, computations, notes and references delineated hereon have been prepared by the undersigned Professional Engineer, duly licensed in the State of West Virginia. All Plans, Notes, and/or References hereon included in this design constitute a complete set of Plans and Specifications for the project and shall be construed in accordance with the standards with the design. A complete set of Plans is necessary to construct the site in accordance with the design.
 Zakaria C. Samadpour
 P.E., State of West Virginia
 C.A. No. 12282017
 D.W. 12282017



Handwritten signature and date:
 2/15/18

Sheet	Description
1	Cover Sheet
V1	Schedule of Quantities
N1-N3	Site Notes
2	Original Ground Site Conditions
3	Pre-Construction Site Conditions
4	Site Erosion Control Plan
5	Cleaning Exhibit
6	Overall Plan View
7-8	Top Key Exhibit
9	EAS Plan View
10-11	Cross Sections - Well Pad
12	Cross Sections - Access Roads
13	Geotechnical Exhibit
GI-G2	Site Reclamation
S1	Production Exhibit
M1-M3	Erosion and Sediment Control Details
D1-D2	Access Road Details
P1	Pad Details

Date	Revision
12-28-2017	Design

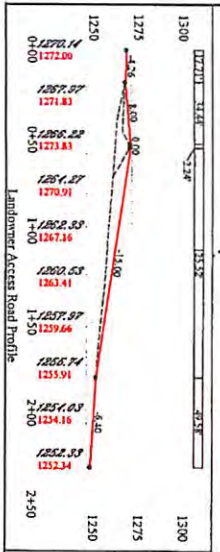
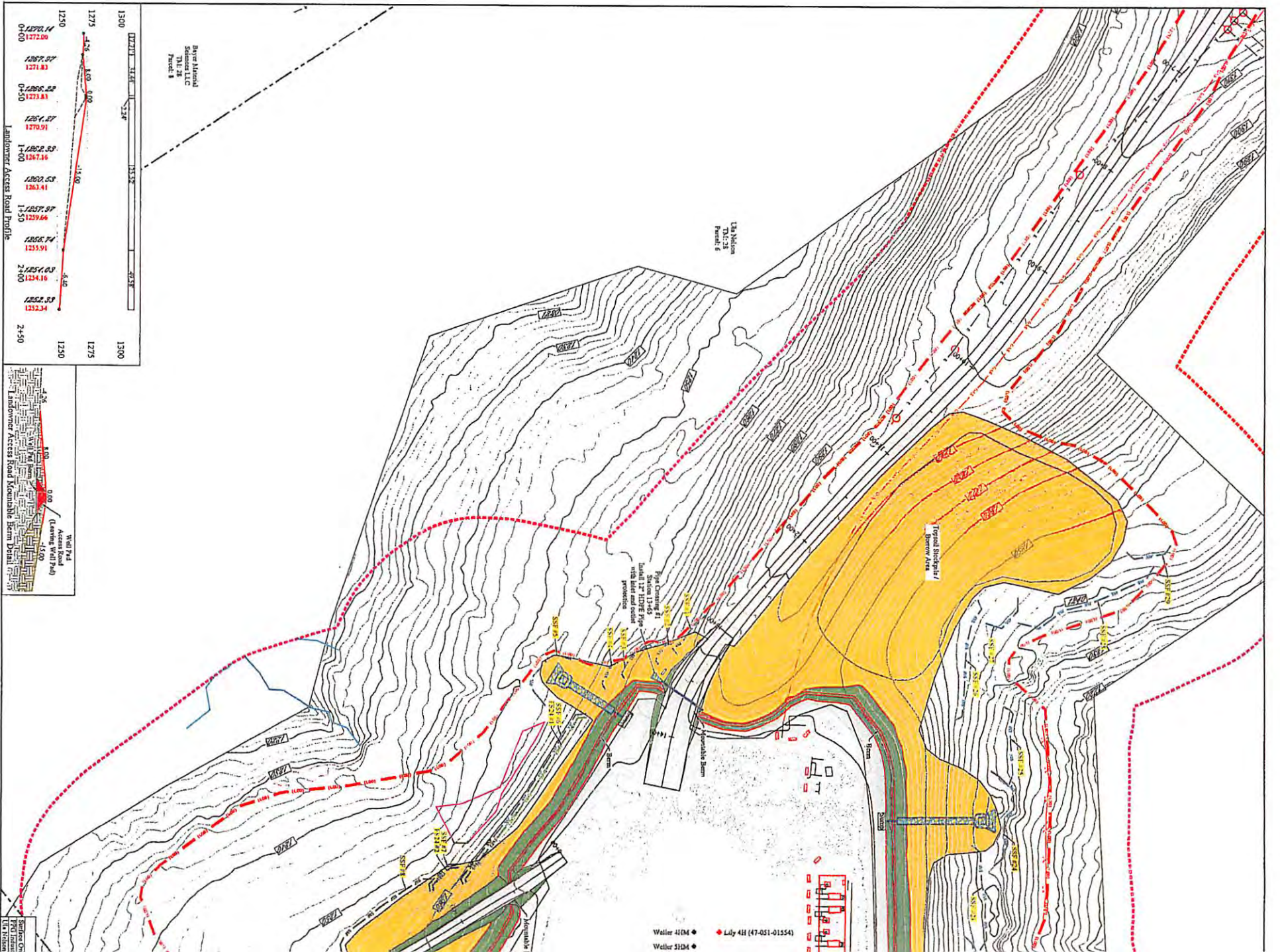


THIS DOCUMENT PREPARED FOR TUG HILL OPERATING



Cover Sheet
 Lily Well Site
 Franklin District
 Marshall County, WV

Date: 12/28/2017
 Scale: As Shown
 Designed By: ZS
 File No.
 Sheet 1 of 13



Project On: [illegible]
 Project No: [illegible]
 Date: [illegible]

