



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 6HM
47-051-02038-00-00

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

A blue ink signature of James A. Martin, Chief, is written over a faint, light blue background graphic that resembles a stylized signature or the word 'Signature'.

Operator's Well Number: WELLER 6HM
Farm Name: ULA F. NELSON
U.S. WELL NUMBER: 47-051-02038-00-00
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 494510851 Marshall Franklin New Martinsville 7
Operator ID County District Quadrangle

2) Operator's Well Number: Weller 6HM 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 6469' - 6522', thickness of 53' and an anticipated approx. pressure of 3800 psi.

8) Proposed Total Vertical Depth: 6622'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 14,103'

11) Proposed Horizontal Leg Length: 6,836'

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: _____

WW-6B
(04/15)

API NO. 47- 051 - 02038
 OPERATOR WELL NO. Weller 6HM
 Well Pad Name: Lily

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	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#	2610'	2610'	866ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	14,103'	14,103'	3608ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#	6,795'		
Liners							

JN 6/13/18

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	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			

WW-6B
(10/14)

API NO. 47-051 - 02038
OPERATOR WELL NO. Weller 6HM
Well Pad Name: Lily

JW 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 Onondaga 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 17,090,000 lb. proppant and 264,224 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.

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WW-6B Attachment to #24

Conductor, Coal and Fresh Water Casing Cement:

Premium NE-1 + 2% CaCl

- Premium NE-1 – Class A Portland API Spec
- CaCl – Calcium Chloride

Intermediate Casing:

Premium NE-1 + 2% bwoc CaCl₂ + 46.5% Fresh Water

- Premium NE-1 – Class A Portland API spec
- CaCl₂ – Calcium Chloride
- Cello Flake – Fluid Loss Preventer

Kick Off Plug:

Class H Cement + 1% CD-32 + .7% Sodium Metasilicate + .1% R-3 + .75 gal/100sk FP-13L + 38% Fresh Water

- Class H – Increased Compressive Strength Cement
- Sodium Metasilicate – Free Water Control; Early Strength Additive
- R-3 – Cement Retarder
- FP-13L – Anti-Foaming Agent
- CaCl₂ – Calcium Chloride
- Cello Flake – Fluid Loss Preventer

Production Casing Cement:

Lead: *50:50 (Poz:Premium NE-1) + .2% R-3 + .2% MPA-170 + .75 gal/100sk FP-13L*

Tail: *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*

- Poz – Fly Ash
- Premium NE-1 – Class A Portland API spec
- R-3 – Cement Retarder
- MPA-170 – Gelling Agent
- FP-13L – Anti-Foaming Agent
- ASA-301 – Free Water Control Agent
- BA-10A – Bonding Agent
- ASCA-1 – Solubility Additive

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Tug Hill Operating, LLC Casing and Cement Program

Weller-6HM

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"	2,610'	CTS
Production	5 1/2"	CYHP110	8 7/8 x 8 3/4"	14,103'	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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47051 02038



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

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Permit well - Weller-6HM

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 15, 2010 12:33

Location Information: View Map

API: COUNTY PERMIT TAX DISTRICT QUAD_78 QUAD_78 LAT_BU LONG_DD UTM_E UTM_N

Bottom Hole Location Information:

API EP FLAG UTM_E UTM_N LONG_DD LAT_DD

Owner Information:

API CAMP_DT BUFFER STATUS SURFACE_OWNER WELL_NUM COL_NUM LEASE LEASE_NUM MINERAL_OWN OPERATIONAL_COMPLETION PROP_OB PROP_FRCT_FM WFL_EST_PT

Completion Information:

API CAMP_DT SUD_OF ELEV DATUM FIELD DEEPEST_FM DEEPEST_FTM INITIAL_CLASS FINAL_CLASS TYPE REG CMP_MTHD TND END NEW_FTD O_BEP O_BEP_6_AFT O_BEP_6_AFT_NGR_NGR_WFL

Comment: 15/17/2013 Additional Lease Numbers 1256203-001

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47 051 02038

WV Geological & Economic Survey Well: County = 61 Permit = 01552 Report Time: Friday, January 12, 2012 12:35

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_76	LAT_DD	LONG_DD	UTME	UTMN
470510552	Marshall	1152	Franklin	New Marlinton	New Marlinton	79.77911	80.95212	811891.4	470552.1

Bottom Hole Location Information:

API	EP_FLAG	UTME	UTMN	LON_DD	LAT_DD
470510552	1	811891.4	470552.1	80.95212	79.77911

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	TRG_EST_FR
470510552	12/17/2012	Orig Op/Loc	Completed	Jay Smith	21	1	USA	6091	USA F. Reiss et al.	Owner Registration USA, Inc.	0700	Marshall Co.	

Completion Information:

API	CMP_DT	SPUD_DT	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	IBG	CMP_MTHO	TVD	TMO	NEW_FTG	G_BEP	G_APT	O_BEP	G_APT	NGL_BEP	NGL_A
470510552	12/17/2012	8/29/02	1742	Round Level	Cameron-Sanger	Marshall Sh.	Development Well	Development Well	Oil and Gas	Refrty	Fractured	809	12000	12660	1278	24.0	112	120		

Comment: 12/17/2012 Additional Lease Numbers: 1254203-501

WV Geological & Economic Survey Well: County = 61 Permit = 01553 Report Time: Friday, January 12, 2012 12:34

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_76	LAT_DD	LONG_DD	UTME	UTMN
470510553	Marshall	1153	Franklin	New Marlinton	New Marlinton	79.77749	80.95049	811891.4	470553.2

Bottom Hole Location Information:

API	EP_FLAG	UTME	UTMN	LON_DD	LAT_DD
470510553	1	811890.7	470553.2	80.95119	79.77749

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	TRG_EST_FR
470510553	12/17/2012	Orig Op/Loc	Completed	Jay Smith	21	1	USA	6091	USA F. Reiss et al.	Owner Registration USA, Inc.	0700	Marshall Co.	

Completion Information:

API	CMP_DT	SPUD_DT	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	IBG	CMP_MTHO	TVD	TMO	NEW_FTG	G_BEP	G_APT	O_BEP	G_APT	NGL_BEP	NGL_A
470510553	12/17/2012	8/29/02	1742	Round Level	Cameron-Sanger	Marshall Sh.	Development Well	Development Well	Oil and Gas	Refrty	Fractured	809	12000	12660	1278	24.0	112	120		

Comment: 12/17/2012 Additional Lease Numbers: 1254203-501

WV Geological & Economic Survey Well: County = 61 Permit = 01654 Report Time: Friday, January 12, 2012

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_76	LAT_DD	LONG_DD	UTME	UTMN
470510154	Marshall	1154	Franklin	New Marlinton	New Marlinton	79.77749	80.95049	811891.4	470553.2

Bottom Hole Location Information:

API	EP_FLAG	UTME	UTMN	LON_DD	LAT_DD
470510154	1	811890.7	470553.2	80.95119	79.77749

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	TRG_EST_FR
470510154	12/17/2012	Orig Op/Loc	Completed	Jay Smith	21	1	USA	6091	USA F. Reiss et al.	Owner Registration USA, Inc.	0700	Marshall Co.	

Completion Information:

API	CMP_DT	SPUD_DT	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	IBG	CMP_MTHO	TVD	TMO	NEW_FTG	G_BEP	G_APT	O_BEP	G_APT	NGL_BEP	NGL_A
470510154	12/17/2012	8/29/02	1742	Round Level	Cameron-Sanger	Marshall Sh.	Development Well	Development Well	Oil and Gas	Refrty	Fractured	812	12142	12142	1374	1588	116	120		

WV Geological & Economic Survey Well: County = 61 Permit = 00213 Report Time: Friday, January 12, 2012

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_76	LAT_DD	LONG_DD	UTME	UTMN
4705100213	Marshall	213	Franklin	New Marlinton	New Marlinton	79.778188	80.957448	810499	4702796.3

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	TRG_EST_FR
4705100213	7/11/1950	Original Loc	Completed	Jay McHenry	1	1	USA	1899	USA Henry	Urgen. Elong.			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	IBG	CMP_MTHO	TVD	TMO	NEW_FTG	G
4705100213	7/11/1950	5/10/50	1742	Round Level	Unnamed	Hampshire Gp	Hampshire Gp	Congrat (Elongation)	Test Unsuccessful	Qty	Unopen	Not Open	2694	2694	

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 - Oriskany Flk	750	Reasonable	2	Reasonable	1242 Ground Level
4705100213	Original Loc	unidentified coal		636	Reasonable	2	Reasonable	1242 Ground Level
4705100213	Original Loc	1st Gow Run/Unconform	Well Record	1336	Reasonable	49	Reasonable	1242 Ground Level
4705100213	Original Loc	Hampers S&Oz Cow Run	Well Record	1420	Reasonable	40	Reasonable	1242 Ground Level
4705100213	Original Loc	S&Oz S&Oz Cow Run	Well Record	1530	Reasonable	114	Reasonable	1242 Ground Level
4705100213	Original Loc	Mawton	Well Record	1585	Reasonable	50	Reasonable	1242 Ground Level
4705100213	Original Loc	Big Lime	Well Record	1673	Reasonable	87	Reasonable	1242 Ground Level
4705100213	Original Loc	Glenshield Group	Well Record	1873	Reasonable	122	Reasonable	1242 Ground Level
4705100213	Original Loc	Keener	Well Record	1900	Reasonable	12	Reasonable	1242 Ground Level
4705100213	Original Loc	Big Injun (Pres&g)	Well Record	1972	Reasonable	238	Reasonable	1242 Ground Level

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


Plugging Information:

API	PLG_DT	DEPTH_PLG
4705100213	7/20/1950	0

There is no Sample data for this well

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		Select County: (051) Marshall	Select datatypes: (Check All)	Table Descriptions
Enter Permit #: 00308		<input checked="" type="checkbox"/> Location	<input checked="" type="checkbox"/> Production	<input checked="" type="checkbox"/> Plugging
<input type="button" value="Get Data"/> <input type="button" value="Reset"/>		<input checked="" type="checkbox"/> Owner/Completion	<input checked="" type="checkbox"/> Stratigraphy	<input checked="" type="checkbox"/> Seismic
		<input checked="" type="checkbox"/> Psychrometric	<input checked="" type="checkbox"/> Logs	<input checked="" type="checkbox"/> Well Hole Log
		Table Descriptions: County Code Translations County Numbering Scheme Usage Notes Contact Information Acronym WVGES Help Feedback		

WV Geological & Economic Survey **Well: County = 61 Permit = 00308** Report Time: Friday, January 12, 2018

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX DISTRICT	QUAD 35	QUAD 36	LAT 60	LONG 00	UTME	UTMN
4705100308	Marshall	308	Franklin	New Marlsville	New Marlsville	39.732066	-80.793209	512185.1	4297617.1

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	EA/AF	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPL FROM	PROP_VO	PROP_TEND_FM	TRM_EST_PR
4705100308	9/30/1957	Original Loc	Completed	H.P Smith	1		H.P Smith		J Barnes	Archedeck Exploration Co.			

Completion Information:

API	CMP DT	SUFFIX	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL CLASS	FINAL CLASS	TYPE	REC	CMP METH	TVD	TMD	NEW FTG	G_BEP	G_WF
4705100308	9/30/1957	7991957	1226	Ground Level	Camacho-Garner	Pth	Development Well	Unsuccessful	Drill w/ Gas Show	unintention	Nat/Open H	3500		3500		0

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:

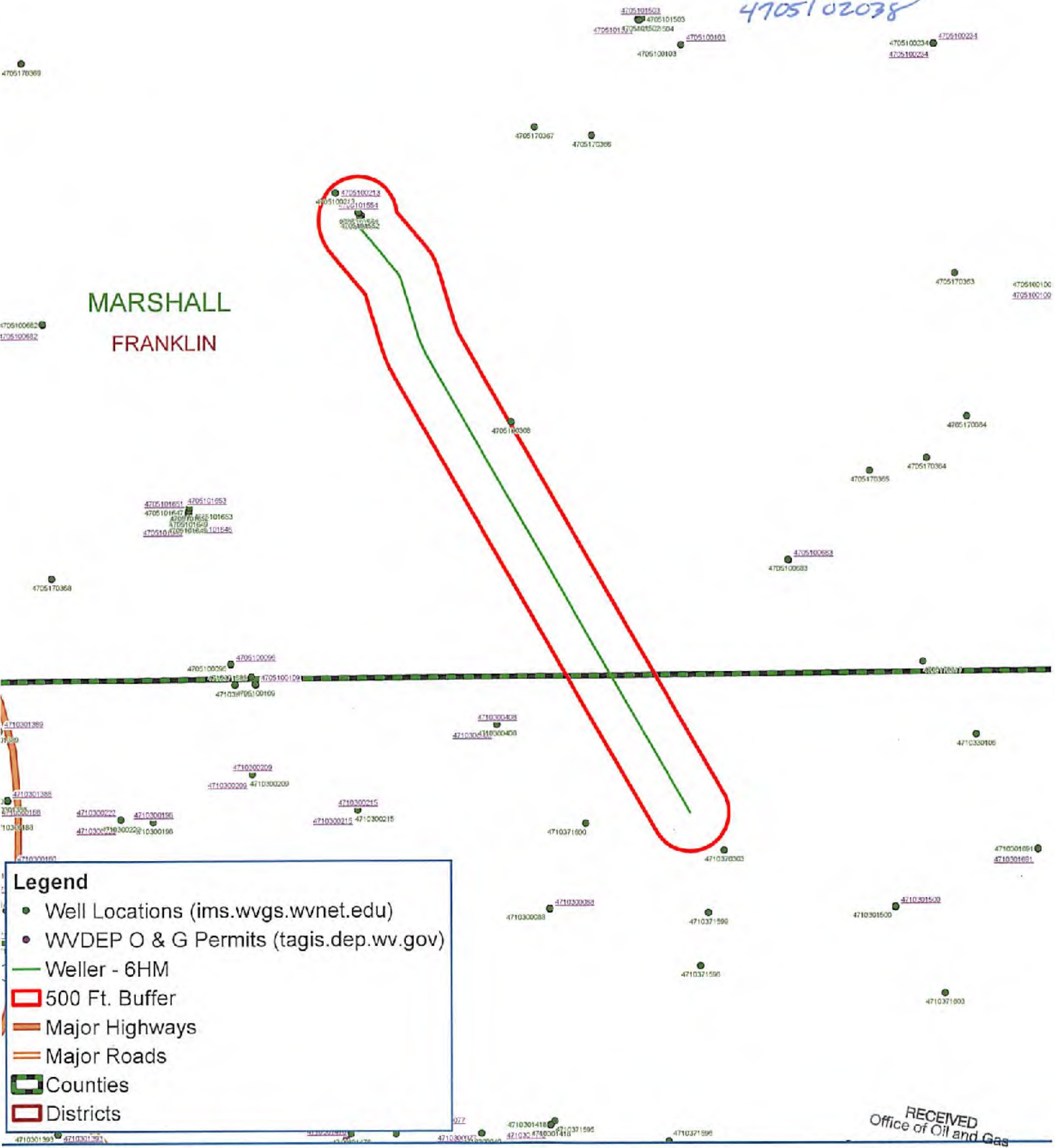
API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_QUALITY	THICKNESS	THICKNESS_QUALITY	R/EV	DATUM
4705100308	Original Loc	unidentified coal	Well Record	495	Reasonable	2	Reasonable	1226	Ground Level
4705100308	Original Loc	unidentified coal	Well Record	475	Reasonable	2	Reasonable	1226	Ground Level
4705100308	Original Loc	Sewickley coal	Well Record	728	Reasonable	2	Reasonable	1228	Ground Level
4705100308	Original Loc	Pittsburgh coal	Well Record	819	Reasonable	8	Reasonable	1226	Ground Level
4705100308	Original Loc	1st Gow Rock/indivisive	Well Record	1174	Reasonable	55	Reasonable	1228	Ground Level
4705100308	Original Loc	Manong Skigg Dunk	Well Record	1267	Reasonable	35	Reasonable	1226	Ground Level
4705100308	Original Loc	Lo Ryan Salt/Pit 5a	Well Record	1378	Reasonable	87	Reasonable	1055	Ground Level
4705100308	Original Loc	Allegheny coal (vgt)	CBM, Unstere Pick	1430	Reasonable	1	Reasonable	1228	Ground Level
4705100308	Original Loc	1st Salt Sand	Well Record	1534	Reasonable	80	Reasonable	1226	Ground Level
4705100308	Original Loc	2nd Salt Sand	Well Record	1643	Reasonable	77	Reasonable	1228	Ground Level
4705100308	Original Loc	Maxton	Well Record	1770	Reasonable	72	Reasonable	1226	Ground Level
4705100308	Original Loc	Little Lane	Well Record	1908	Reasonable	12	Reasonable	1226	Ground Level
4705100308	Original Loc	Pencil Cave	Well Record	1978	Reasonable	2	Reasonable	1226	Ground Level
4705100308	Original Loc	Greensboro Group	Well Record	1980	Reasonable	52	Reasonable	1228	Ground Level
4705100308	Original Loc	Big Lane	Well Record	1950	Reasonable	42	Reasonable	1220	Ground Level
4705100308	Original Loc	Kearner	Well Record	1920	Reasonable	28	Reasonable	1220	Ground Level
4705100308	Original Loc	Big Injun (Freezing)	Well Record	1962	Reasonable	218	Reasonable	1228	Ground Level
4705100308	Original Loc	Gordon Stray	Well Record	2014	Reasonable	18	Reasonable	1226	Ground Level
4705100308	Original Loc	Gordon	Well Record	2025	Reasonable	27	Reasonable	1226	Ground Level
4705100308	Original Loc	Freshly	Well Record	2027	Reasonable	16	Reasonable	1226	Ground Level
4705100308	Original Loc	Pth	Well Record	2035	Reasonable	16	Reasonable	1228	Ground Level

Plugging Information:

API	PLG_DT	DEPTH_PST
4705100308	9/30/1957	0

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Legend

- Well Locations (ims.wvgs.wvnet.edu)
- WVDEP O & G Permits (tagis.dep.wv.gov)
- Weller - 6HM
- 500 Ft. Buffer
- Major Highways
- Major Roads
- Counties
- Districts



Weller - 6HM
Franklin District
Marshall County, WV



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WELL NAME: **Weller-6HM**
 STATE: **West Virginia** COUNTY: **Marshall**
 DISTRICT: **Franklin**
 DF Elev: **1,273'** GL Elev: **1,273'**
 TD: **14,103'**
 TH Latitude: **39.7374043**
 TH Longitude: **-80.80639249**
 BH Latitude: **39.71371958**
 BH Longitude: **-80.79548673**

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	871
Sewickley Coal	778
Pittsburgh Coal	866
Big Lime	2013
Weir	2369
Berea	2553
Gordon	2863
Rhinestreet	5857
Genesee/Berkett	6365
Tully	6388
Hamilton	6417
Marcellus	6469
Landing Depth	6508
Onondaga	6522
Pilot Hole Depth	6622

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	2,610'	2,600'	36	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	14,103'	6,628'	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	849	A	15	Air	1 Centralizer every other jt
Production	3,184	A	14.5	Air / SOBMM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to slc



Pilot Hole
PH TD @
6,622' TVD

Landing Point @ 7,267' MD / 6,508' TVD
PH TVD = 100' below Onondaga Top

Lateral TD @ 14,103' ft MD
6,628 ft TVD

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Handwritten signature and date: 3/28/18

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Well: **Weller 6 HM (C)**
 Site: **Lily/Weller**
 Project: **Marshall County, West Virginia**
 Design: **rev0**

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1700.00	0.00	0.00	1700.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2°/100' build
3	2200.00	10.00	195.00	2197.47	-42.04	-11.26	2.00	195.00	31.25	Begin 2°/100' build/turn
4	2933.66	18.00	140.00	2911.51	-191.22	45.42	2.00	-87.87	189.15	Begin 2°/100' build
5	5234.78	18.00	140.00	5100.00	-735.94	502.50	0.00	0.00	887.45	Begin 2°/100' turn
6	5591.78	18.00	163.13	5439.53	-832.30	554.67	2.00	90.00	997.01	Begin 18.00° tangent
7	6294.65	18.00	163.13	6108.00	-1040.15	617.69	0.00	0.00	1209.27	Begin 10°/100' build
8	7004.65	89.00	163.13	6503.82	-1552.06	772.89	10.00	0.00	1732.01	Begin 5°/100' turn
9	7267.30	89.00	150.00	6503.43	-1792.48	877.10	5.00	-90.13	1992.76	Begin 89.00° lateral section
0	14102.92	89.00	150.00	6628.00	-7711.34	4294.48	0.00	0.00	8826.51	PBHL/TD 14102.92 MD/6628.00 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: GL @ 1273.00usft

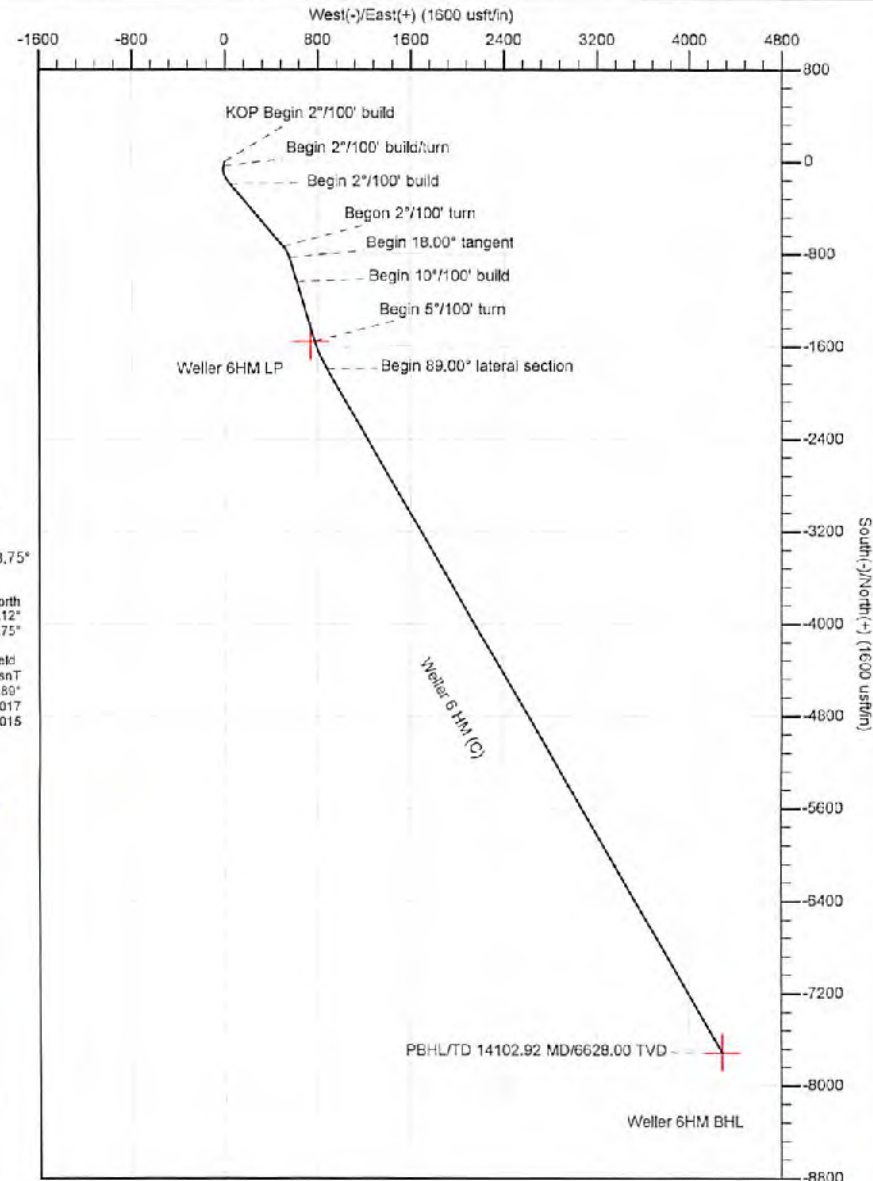
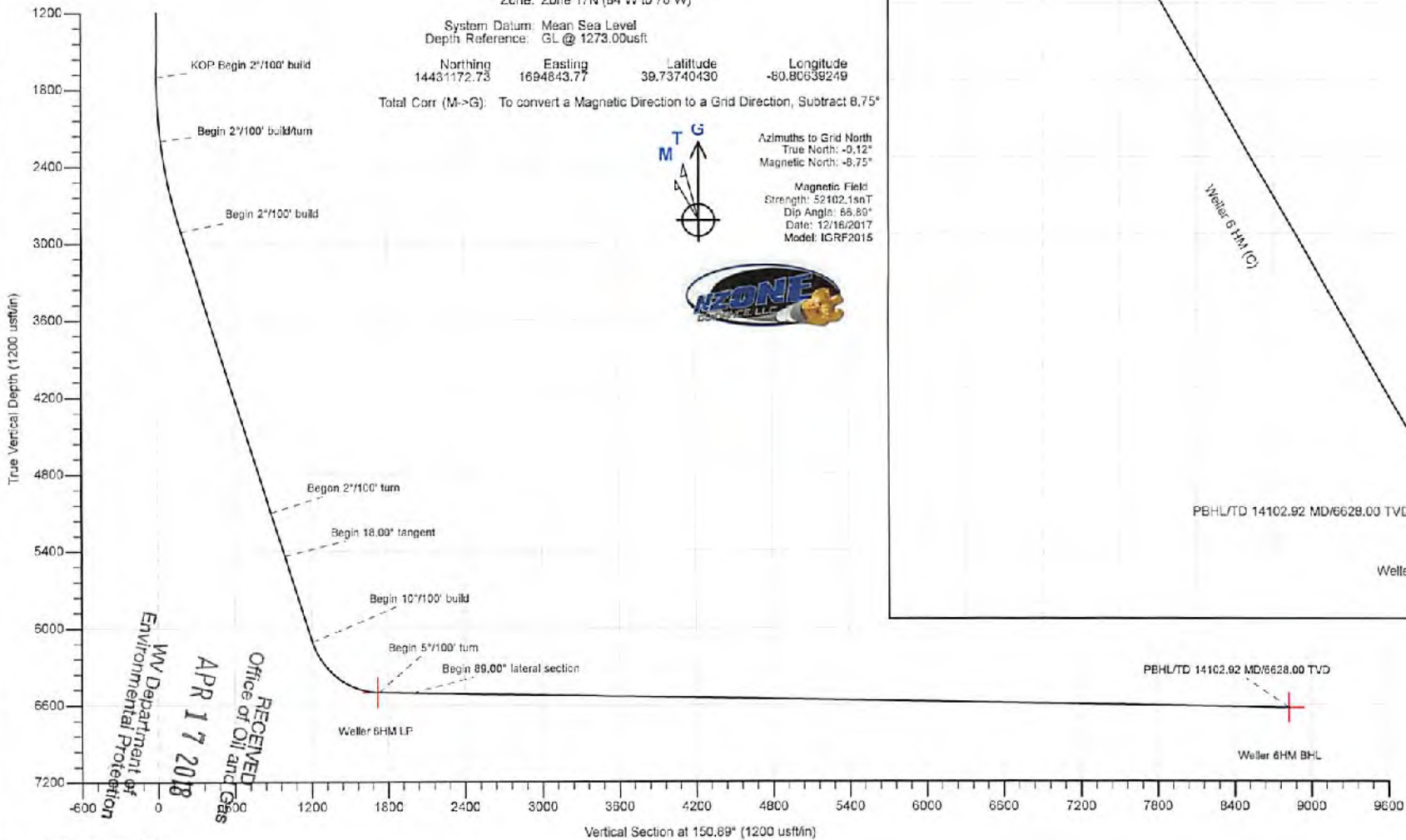
Northing: 14431172.73 Easting: 1694843.77 Latitude: 39.73740430 Longitude: -80.80639249

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: 52102.1usT
 Dip Angle: 85.80°
 Date: 12/16/2017
 Model: IGRF2015



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Planning Report

Database:	DB_Jul2218dt_V14	Local Co-ordinate Reference:	Well Weller 6 HM (C)
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 6 HM (C)	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)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
9,300.00	89.00	150.00	6,543.98	-3,552.56	1,893.32	4,024.90	0.00	0.00	0.00	
9,400.00	89.00	150.00	6,545.73	-3,639.15	1,943.31	4,124.87	0.00	0.00	0.00	
9,500.00	89.00	150.00	6,547.48	-3,725.74	1,993.31	4,224.85	0.00	0.00	0.00	
9,600.00	89.00	150.00	6,549.23	-3,812.33	2,043.30	4,324.82	0.00	0.00	0.00	
9,700.00	89.00	150.00	6,550.98	-3,898.92	2,093.29	4,424.79	0.00	0.00	0.00	
9,800.00	89.00	150.00	6,552.73	-3,985.51	2,143.29	4,524.77	0.00	0.00	0.00	
9,900.00	89.00	150.00	6,554.48	-4,072.10	2,193.28	4,624.74	0.00	0.00	0.00	
10,000.00	89.00	150.00	6,556.23	-4,158.68	2,243.27	4,724.71	0.00	0.00	0.00	
10,100.00	89.00	150.00	6,557.98	-4,245.27	2,293.27	4,824.68	0.00	0.00	0.00	
10,200.00	89.00	150.00	6,559.73	-4,331.86	2,343.26	4,924.66	0.00	0.00	0.00	
10,300.00	89.00	150.00	6,561.48	-4,418.45	2,393.26	5,024.63	0.00	0.00	0.00	
10,400.00	89.00	150.00	6,563.23	-4,505.04	2,443.25	5,124.60	0.00	0.00	0.00	
10,500.00	89.00	150.00	6,564.98	-4,591.63	2,493.24	5,224.57	0.00	0.00	0.00	
10,600.00	89.00	150.00	6,566.72	-4,678.21	2,543.24	5,324.55	0.00	0.00	0.00	
10,700.00	89.00	150.00	6,568.47	-4,764.80	2,593.23	5,424.52	0.00	0.00	0.00	
10,800.00	89.00	150.00	6,570.22	-4,851.39	2,643.22	5,524.49	0.00	0.00	0.00	
10,900.00	89.00	150.00	6,571.97	-4,937.98	2,693.22	5,624.47	0.00	0.00	0.00	
11,000.00	89.00	150.00	6,573.72	-5,024.57	2,743.21	5,724.44	0.00	0.00	0.00	
11,100.00	89.00	150.00	6,575.47	-5,111.16	2,793.21	5,824.41	0.00	0.00	0.00	
11,200.00	89.00	150.00	6,577.22	-5,197.75	2,843.20	5,924.38	0.00	0.00	0.00	
11,300.00	89.00	150.00	6,578.97	-5,284.33	2,893.19	6,024.36	0.00	0.00	0.00	
11,400.00	89.00	150.00	6,580.72	-5,370.92	2,943.19	6,124.33	0.00	0.00	0.00	
11,500.00	89.00	150.00	6,582.47	-5,457.51	2,993.18	6,224.30	0.00	0.00	0.00	
11,600.00	89.00	150.00	6,584.22	-5,544.10	3,043.17	6,324.27	0.00	0.00	0.00	
11,700.00	89.00	150.00	6,585.97	-5,630.69	3,093.17	6,424.25	0.00	0.00	0.00	
11,800.00	89.00	150.00	6,587.72	-5,717.28	3,143.16	6,524.22	0.00	0.00	0.00	
11,900.00	89.00	150.00	6,589.46	-5,803.87	3,193.15	6,624.19	0.00	0.00	0.00	
12,000.00	89.00	150.00	6,591.21	-5,890.45	3,243.15	6,724.17	0.00	0.00	0.00	
12,100.00	89.00	150.00	6,592.96	-5,977.04	3,293.14	6,824.14	0.00	0.00	0.00	
12,200.00	89.00	150.00	6,594.71	-6,063.63	3,343.14	6,924.11	0.00	0.00	0.00	
12,300.00	89.00	150.00	6,596.46	-6,150.22	3,393.13	7,024.08	0.00	0.00	0.00	
12,400.00	89.00	150.00	6,598.21	-6,236.81	3,443.12	7,124.06	0.00	0.00	0.00	
12,500.00	89.00	150.00	6,599.96	-6,323.40	3,493.12	7,224.03	0.00	0.00	0.00	
12,600.00	89.00	150.00	6,601.71	-6,409.99	3,543.11	7,324.00	0.00	0.00	0.00	
12,700.00	89.00	150.00	6,603.46	-6,496.57	3,593.10	7,423.97	0.00	0.00	0.00	
12,800.00	89.00	150.00	6,605.21	-6,583.16	3,643.10	7,523.95	0.00	0.00	0.00	
12,900.00	89.00	150.00	6,606.96	-6,669.75	3,693.09	7,623.92	0.00	0.00	0.00	
13,000.00	89.00	150.00	6,608.71	-6,756.34	3,743.09	7,723.89	0.00	0.00	0.00	
13,100.00	89.00	150.00	6,610.46	-6,842.93	3,793.08	7,823.87	0.00	0.00	0.00	
13,200.00	89.00	150.00	6,612.21	-6,929.52	3,843.07	7,923.84	0.00	0.00	0.00	
13,300.00	89.00	150.00	6,613.95	-7,016.10	3,893.07	8,023.81	0.00	0.00	0.00	
13,400.00	89.00	150.00	6,615.70	-7,102.69	3,943.06	8,123.78	0.00	0.00	0.00	
13,500.00	89.00	150.00	6,617.45	-7,189.28	3,993.05	8,223.76	0.00	0.00	0.00	
13,600.00	89.00	150.00	6,619.20	-7,275.87	4,043.05	8,323.73	0.00	0.00	0.00	
13,700.00	89.00	150.00	6,620.95	-7,362.46	4,093.04	8,423.70	0.00	0.00	0.00	
13,800.00	89.00	150.00	6,622.70	-7,449.05	4,143.04	8,523.67	0.00	0.00	0.00	
13,900.00	89.00	150.00	6,624.45	-7,535.64	4,193.03	8,623.65	0.00	0.00	0.00	
14,000.00	89.00	150.00	6,626.20	-7,622.22	4,243.02	8,723.62	0.00	0.00	0.00	
14,100.00	89.00	150.00	6,627.95	-7,708.81	4,293.02	8,823.59	0.00	0.00	0.00	
14,102.92	89.00	150.00	6,628.00	-7,711.34	4,294.48	8,826.51	0.00	0.00	0.00	

PBHL/TD 14102.92 MD/6628.00 TVD

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COMPASS 5000 Production

47051 02038



Planning Report

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Weller 6 HM (C)
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 6 HM (C)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Weller 6HM LP - hit/miss target - Shape - Point	0.00	0.00	6,504.00	-1,555.62	740.47	14,429,617.11	1,695,584.24	39.73312767	-80.80377063
- plan misses target center by 32.06usft at 6998.69usft MD (6503.88 TVD, -1546.36 N, 771.16 E)									
Weller 6HM BHL - plan hits target center - Point	0.00	0.00	6,628.00	-7,711.34	4,294.48	14,423,461.39	1,699,138.25	39.71620012	-80.79118021

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
1,700.00	1,700.00	0.00	0.00	KOP Begin 2°/100' build	
2,200.00	2,197.47	-42.04	-11.26	Begin 2°/100' build/turn	
2,933.66	2,911.51	-191.22	45.42	Begin 2°/100' build	
5,234.78	5,100.00	-735.94	502.50	Begin 2°/100' turn	
5,591.78	5,439.53	-832.30	554.67	Begin 18.00° tangent	
6,294.65	6,108.00	-1,040.15	617.69	Begin 10°/100' build	
7,004.65	6,503.82	-1,552.06	772.89	Begin 5°/100' turn	
7,267.30	6,508.43	-1,792.48	877.10	Begin 89.00° lateral section	
14,102.92	6,628.00	-7,711.34	4,294.48	PBHL/TD 14102.92 MD/6628.00 TVD	

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Environmental Protection

47 051 02038



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Weller 6 HM (C)
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 6 HM (C)	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 6 HM (C)					
Well Position	+N-S	0.00 usft	Northing:	14,431,172.73 usft	Latitude:	39.73740430
	+E-W	0.00 usft	Easting:	1,694,843.77 usft	Longitude:	-80.80639249
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	66.89	52,102.08564020

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	150.89

Plan Survey Tool Program	Date	12/17/2017		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	14,102.92 rev0 (Original Hole)	MWD	
			MWD - Standard	

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Environmental Protection

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Planning Report - Geographic

Database:	DB_Jul2215dt_v14	Local Co-ordinate Reference:	Well Weller 6 HM (C)
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 6 HM (C)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

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		
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00		
2,200.00	10.00	195.00	2,197.47	-42.04	-11.26	2.00	2.00	0.00	195.00		
2,933.66	18.00	140.00	2,911.51	-191.22	45.42	2.00	1.09	-7.50	-87.87		
5,234.78	18.00	140.00	5,100.00	-735.94	502.50	0.00	0.00	0.00	0.00		
5,591.78	18.00	163.13	5,439.53	-832.30	554.87	2.00	0.00	6.48	90.00		
6,294.65	18.00	163.13	6,106.00	-1,040.15	617.69	0.00	0.00	0.00	0.00		
7,004.65	89.00	163.13	6,503.82	-1,552.06	772.89	10.00	10.00	0.00	0.00		
7,267.30	89.00	150.00	6,506.43	-1,792.48	877.10	5.00	0.00	-5.00	-90.13		
14,102.92	89.00	150.00	6,628.00	-7,711.34	4,294.48	0.00	0.00	0.00	0.00	Weller 6HM BHL	

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Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Weller 6 HM (C)
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 6 HM (C)	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	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
100.00	0.00	0.00	100.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
200.00	0.00	0.00	200.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
300.00	0.00	0.00	300.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
400.00	0.00	0.00	400.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
500.00	0.00	0.00	500.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
600.00	0.00	0.00	600.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
700.00	0.00	0.00	700.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
800.00	0.00	0.00	800.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
900.00	0.00	0.00	900.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
1,400.00	0.00	0.00	1,400.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
1,600.00	0.00	0.00	1,600.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
1,700.00	0.00	0.00	1,700.00	0.00	0.00	14,431,172.73	1,694,843.77	39.73740430	-80.80639249	
KOP Begin 2°/100' build										
1,800.00	2.00	195.00	1,799.98	-1.69	-0.45	14,431,171.04	1,694,843.32	39.73739967	-80.80639411	
1,900.00	4.00	195.00	1,899.64	-6.74	-1.81	14,431,165.99	1,694,841.97	39.73738580	-80.80639897	
2,000.00	6.00	195.00	1,999.45	-15.18	-4.06	14,431,157.57	1,694,839.71	39.73736269	-80.80640706	
2,100.00	8.00	195.00	2,098.70	-26.93	-7.22	14,431,145.80	1,694,836.56	39.73733038	-80.80641837	
2,200.00	10.00	195.00	2,197.47	-42.04	-11.26	14,431,130.89	1,694,832.51	39.73728891	-80.80643288	
Begin 2°/100' build/turn										
2,300.00	10.27	183.72	2,295.91	-59.32	-14.09	14,431,113.41	1,694,829.68	39.73724147	-80.80644307	
2,400.00	10.90	173.37	2,394.22	-77.61	-13.59	14,431,095.12	1,694,830.20	39.73719124	-80.80644136	
2,500.00	11.84	164.38	2,492.27	-96.88	-9.72	14,431,075.85	1,694,834.05	39.73713830	-80.80642782	
2,600.00	13.01	158.85	2,589.93	-117.11	-2.54	14,431,055.62	1,694,841.24	39.73708270	-80.80640241	
2,700.00	14.37	150.63	2,687.09	-138.27	7.98	14,431,034.46	1,694,851.75	39.73702451	-80.80636518	
2,800.00	15.86	145.50	2,783.64	-160.35	21.80	14,431,012.38	1,694,855.57	39.73698381	-80.80631617	
2,900.00	17.45	141.26	2,879.44	-183.30	38.92	14,430,989.43	1,694,882.69	39.73690067	-80.80625545	
2,933.68	18.00	140.00	2,911.51	-191.22	45.42	14,430,981.51	1,694,889.19	39.73687888	-80.80623236	
Begin 2°/100' build										
3,000.00	18.00	140.00	2,974.60	-206.92	58.60	14,430,965.60	1,694,902.37	39.73683568	-80.80618563	
3,100.00	18.00	140.00	3,069.70	-230.60	78.48	14,430,942.13	1,694,922.23	39.73677055	-80.80611516	
3,200.00	18.00	140.00	3,164.81	-254.27	98.33	14,430,918.46	1,694,942.10	39.73670542	-80.80604468	
3,300.00	18.00	140.00	3,259.92	-277.94	118.19	14,430,894.79	1,694,961.96	39.73664029	-80.80597421	
3,400.00	18.00	140.00	3,355.02	-301.61	138.05	14,430,871.12	1,694,981.82	39.73657516	-80.80590374	
3,500.00	18.00	140.00	3,450.13	-325.29	157.92	14,430,847.44	1,695,001.69	39.73651003	-80.80583326	
3,600.00	18.00	140.00	3,545.23	-348.96	177.78	14,430,823.77	1,695,021.55	39.73644490	-80.80576279	
3,700.00	18.00	140.00	3,640.34	-372.63	197.64	14,430,800.10	1,695,041.41	39.73637977	-80.80569232	
3,800.00	18.00	140.00	3,735.44	-396.30	217.51	14,430,776.43	1,695,061.28	39.73631464	-80.80562184	
3,900.00	18.00	140.00	3,830.55	-419.97	237.37	14,430,752.76	1,695,081.14	39.73624952	-80.80555137	
4,000.00	18.00	140.00	3,925.66	-443.65	257.23	14,430,729.08	1,695,101.00	39.73618439	-80.80548090	
4,100.00	18.00	140.00	4,020.76	-467.32	277.10	14,430,705.41	1,695,120.87	39.73611926	-80.80541042	
4,200.00	18.00	140.00	4,115.87	-490.99	296.96	14,430,681.74	1,695,140.73	39.73605413	-80.80533995	
4,300.00	18.00	140.00	4,210.97	-514.66	316.82	14,430,658.07	1,695,160.59	39.73598900	-80.80526948	
4,400.00	18.00	140.00	4,306.08	-538.33	336.69	14,430,634.39	1,695,180.46	39.73592387	-80.80519901	
4,500.00	18.00	140.00	4,401.18	-562.01	356.55	14,430,610.72	1,695,200.32	39.73585874	-80.80512853	
4,600.00	18.00	140.00	4,496.29	-585.68	376.41	14,430,587.05	1,695,220.18	39.73579361	-80.80505806	
4,700.00	18.00	140.00	4,591.39	-609.35	396.28	14,430,563.38	1,695,240.05	39.73572848	-80.80498759	
4,800.00	18.00	140.00	4,686.50	-633.02	416.14	14,430,539.71	1,695,259.91	39.73566335	-80.80491712	
4,900.00	18.00	140.00	4,781.61	-656.69	436.00	14,430,516.03	1,695,279.77	39.73559822	-80.80484665	

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Planning Report - Geographic

Database:	DB_Jul2218dLv14	Local Co-ordinate Reference:	Well Weller 6 HM (C)
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 6 HM (C)	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	18.00	140.00	4,876.71	-680.37	455.86	14,430,492.36	1,695,299.64	39.73553309	-80.80477617
5,100.00	18.00	140.00	4,971.82	-704.04	475.73	14,430,468.69	1,695,319.50	39.73546795	-80.80470570
5,200.00	18.00	140.00	5,066.92	-727.71	495.59	14,430,445.02	1,695,339.36	39.73540283	-80.80463523
5,234.78	18.00	140.00	5,100.00	-735.94	502.50	14,430,438.79	1,695,346.27	39.73538018	-80.80461072
Begon 2°/100' turn									
5,300.00	18.00	144.23	5,162.03	-751.85	514.87	14,430,420.88	1,695,356.65	39.73533644	-80.80456683
5,400.00	18.00	150.71	5,257.13	-777.88	531.48	14,430,394.84	1,695,375.25	39.73526483	-80.80450795
5,500.00	18.00	157.19	5,352.24	-805.63	545.05	14,430,367.10	1,695,386.62	39.73518854	-80.80445991
5,591.78	18.00	163.13	5,439.53	-832.30	554.67	14,430,340.43	1,695,398.44	39.73511525	-80.80442590
Begin 18.00° tangent									
5,600.00	18.00	163.13	5,447.35	-834.73	555.41	14,430,338.00	1,695,399.18	39.73510857	-80.80442329
5,700.00	18.00	163.13	5,542.45	-864.30	564.37	14,430,308.43	1,695,406.14	39.73502730	-80.80439163
5,800.00	18.00	163.13	5,637.56	-893.87	573.34	14,430,278.86	1,695,417.11	39.73494604	-80.80435997
5,900.00	18.00	163.13	5,732.66	-923.45	582.30	14,430,249.28	1,695,426.08	39.73486477	-80.80432831
6,000.00	18.00	163.13	5,827.77	-953.02	591.27	14,430,219.71	1,695,435.04	39.73478350	-80.80429664
6,100.00	18.00	163.13	5,922.87	-982.59	600.24	14,430,190.14	1,695,444.01	39.73470223	-80.80426498
6,200.00	18.00	163.13	6,017.98	-1,012.16	609.20	14,430,160.57	1,695,452.97	39.73462096	-80.80423332
6,294.85	18.00	163.13	6,108.00	-1,040.15	617.69	14,430,132.57	1,695,461.46	39.73454404	-80.80420335
Begin 10°/100' build									
6,300.00	18.53	163.13	6,113.08	-1,041.76	618.18	14,430,130.97	1,695,461.95	39.73453963	-80.80420163
6,400.00	28.53	163.13	6,204.64	-1,079.92	629.75	14,430,092.81	1,695,473.52	39.73443475	-80.80416077
6,500.00	38.53	163.13	6,287.69	-1,132.72	645.75	14,430,040.01	1,695,489.53	39.73428965	-80.80410424
6,600.00	48.53	163.13	6,360.30	-1,198.56	665.71	14,429,974.17	1,695,509.48	39.73410873	-80.80403376
6,700.00	58.53	163.13	6,419.65	-1,275.42	689.02	14,429,897.31	1,695,532.79	39.73389750	-80.80395146
6,800.00	68.53	163.13	6,464.16	-1,360.98	714.96	14,429,811.75	1,695,558.73	39.73368236	-80.80385986
6,900.00	78.53	163.13	6,492.47	-1,452.64	742.75	14,429,720.09	1,695,586.52	39.73341048	-80.80376173
7,000.00	88.53	163.13	6,503.72	-1,547.61	771.54	14,429,625.12	1,695,615.31	39.73314949	-80.80366005
7,004.85	89.00	163.13	6,503.82	-1,552.08	772.89	14,429,620.87	1,695,616.66	39.73313726	-80.80365528
Begin 5°/100' turn									
7,100.00	88.99	158.37	6,505.49	-1,642.04	804.31	14,429,530.69	1,695,648.08	39.73288997	-80.80354422
7,200.00	88.99	153.36	6,507.25	-1,733.25	845.18	14,429,439.48	1,695,688.95	39.73263921	-80.80338956
7,267.30	89.00	150.00	6,508.43	-1,792.48	877.10	14,429,380.25	1,695,720.87	39.73247636	-80.80328650
Begin 89.00° lateral section									
7,300.00	89.00	150.00	6,509.00	-1,820.79	893.44	14,429,351.93	1,695,737.22	39.73239850	-80.80322858
7,400.00	89.00	150.00	6,510.75	-1,907.38	943.44	14,429,265.35	1,695,787.21	39.73218040	-80.80305143
7,500.00	89.00	150.00	6,512.50	-1,993.97	993.43	14,429,178.76	1,695,837.20	39.73192230	-80.80287429
7,600.00	89.00	150.00	6,514.25	-2,080.56	1,043.43	14,429,092.17	1,695,887.20	39.73168420	-80.80269714
7,700.00	89.00	150.00	6,516.00	-2,167.15	1,093.42	14,429,005.58	1,695,937.19	39.73144610	-80.80252000
7,800.00	89.00	150.00	6,517.74	-2,253.74	1,143.41	14,428,918.99	1,695,987.18	39.73120800	-80.80234286
7,900.00	89.00	150.00	6,519.49	-2,340.33	1,193.41	14,428,832.40	1,696,037.18	39.73096990	-80.80216572
8,000.00	89.00	150.00	6,521.24	-2,426.91	1,243.40	14,428,745.81	1,696,087.17	39.73073180	-80.80198858
8,100.00	89.00	150.00	6,522.99	-2,513.50	1,293.39	14,428,659.23	1,696,137.17	39.73049370	-80.80181144
8,200.00	89.00	150.00	6,524.74	-2,600.09	1,343.39	14,428,572.64	1,696,187.16	39.73025560	-80.80163430
8,300.00	89.00	150.00	6,526.49	-2,686.68	1,393.38	14,428,486.05	1,696,237.15	39.73001749	-80.80145717
8,400.00	89.00	150.00	6,528.24	-2,773.27	1,443.37	14,428,399.46	1,696,287.15	39.72977939	-80.80128003
8,500.00	89.00	150.00	6,529.99	-2,859.86	1,493.37	14,428,312.87	1,696,337.14	39.72954129	-80.80110290
8,600.00	89.00	150.00	6,531.74	-2,946.44	1,543.36	14,428,226.28	1,696,387.13	39.72930318	-80.80092577
8,700.00	89.00	150.00	6,533.49	-3,033.03	1,593.36	14,428,139.70	1,696,437.13	39.72906508	-80.80074864
8,800.00	89.00	150.00	6,535.24	-3,119.62	1,643.35	14,428,053.11	1,696,487.12	39.72882698	-80.80057151
8,900.00	89.00	150.00	6,536.99	-3,206.21	1,693.34	14,427,966.52	1,696,537.11	39.72858887	-80.80039438
9,000.00	89.00	150.00	6,538.74	-3,292.80	1,743.34	14,427,879.93	1,696,587.11	39.72835077	-80.80021725
9,100.00	89.00	150.00	6,540.49	-3,379.39	1,793.33	14,427,793.34	1,696,637.10	39.72811266	-80.80004013
9,200.00	89.00	150.00	6,542.23	-3,465.98	1,843.32	14,427,706.75	1,696,687.10	39.72787456	-80.79986299
9,300.00	89.00	150.00	6,543.98	-3,552.56	1,893.32	14,427,620.16	1,696,737.09	39.72763645	-80.79968584

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Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Weller 6 HM (C)
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 6 HM (C)	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	
9,400.00	89.00	150.00	6,545.73	-3,639.15	1,943.31	14,427,533.58	1,696,787.08	39.72739835	-80.79950876	
9,500.00	89.00	150.00	6,547.48	-3,725.74	1,993.31	14,427,446.99	1,696,837.08	39.72716024	-80.79933164	
9,600.00	89.00	150.00	6,549.23	-3,812.33	2,043.30	14,427,360.40	1,696,887.07	39.72692214	-80.79915452	
9,700.00	89.00	150.00	6,550.98	-3,898.92	2,093.29	14,427,273.81	1,696,937.06	39.72668403	-80.79897740	
9,800.00	89.00	150.00	6,552.73	-3,985.51	2,143.29	14,427,187.22	1,696,987.06	39.72644592	-80.79880028	
9,900.00	89.00	150.00	6,554.48	-4,072.10	2,193.28	14,427,100.63	1,697,037.05	39.72620782	-80.79862316	
10,000.00	89.00	150.00	6,556.23	-4,158.68	2,243.27	14,427,014.04	1,697,087.05	39.72596971	-80.79844605	
10,100.00	89.00	150.00	6,557.98	-4,245.27	2,293.27	14,426,927.46	1,697,137.04	39.72573160	-80.79826894	
10,200.00	89.00	150.00	6,559.73	-4,331.86	2,343.26	14,426,840.87	1,697,187.03	39.72549349	-80.79809182	
10,300.00	89.00	150.00	6,561.48	-4,418.45	2,393.26	14,426,754.28	1,697,237.03	39.72525539	-80.79791471	
10,400.00	89.00	150.00	6,563.23	-4,505.04	2,443.25	14,426,667.69	1,697,287.02	39.72501728	-80.79773760	
10,500.00	89.00	150.00	6,564.98	-4,591.63	2,493.24	14,426,581.10	1,697,337.01	39.72477917	-80.79756049	
10,600.00	89.00	150.00	6,566.72	-4,678.21	2,543.24	14,426,494.51	1,697,387.01	39.72454106	-80.79738339	
10,700.00	89.00	150.00	6,568.47	-4,764.80	2,593.23	14,426,407.93	1,697,437.00	39.72430295	-80.79720628	
10,800.00	89.00	150.00	6,570.22	-4,851.39	2,643.22	14,426,321.34	1,697,487.00	39.72406484	-80.79702917	
10,900.00	89.00	150.00	6,571.97	-4,937.98	2,693.22	14,426,234.75	1,697,536.99	39.72382673	-80.79685207	
11,000.00	89.00	150.00	6,573.72	-5,024.57	2,743.21	14,426,148.16	1,697,586.98	39.72358862	-80.79667497	
11,100.00	89.00	150.00	6,575.47	-5,111.16	2,793.21	14,426,061.57	1,697,636.98	39.72335051	-80.79649787	
11,200.00	89.00	150.00	6,577.22	-5,197.75	2,843.20	14,425,974.98	1,697,686.97	39.72311240	-80.79632077	
11,300.00	89.00	150.00	6,578.97	-5,284.33	2,893.19	14,425,888.39	1,697,736.96	39.72287429	-80.79614367	
11,400.00	89.00	150.00	6,580.72	-5,370.92	2,943.18	14,425,801.81	1,697,786.96	39.72263618	-80.79596657	
11,500.00	89.00	150.00	6,582.47	-5,457.51	2,993.18	14,425,715.22	1,697,836.95	39.72239807	-80.79578947	
11,600.00	89.00	150.00	6,584.22	-5,544.10	3,043.17	14,425,628.63	1,697,886.95	39.72215996	-80.79561238	
11,700.00	89.00	150.00	6,585.97	-5,630.69	3,093.17	14,425,542.04	1,697,936.94	39.72192185	-80.79543528	
11,800.00	89.00	150.00	6,587.72	-5,717.28	3,143.16	14,425,455.45	1,697,986.93	39.72168373	-80.79525819	
11,900.00	89.00	150.00	6,589.46	-5,803.87	3,193.15	14,425,368.86	1,698,036.93	39.72144562	-80.79508110	
12,000.00	89.00	150.00	6,591.21	-5,890.45	3,243.15	14,425,282.27	1,698,086.92	39.72120751	-80.79490401	
12,100.00	89.00	150.00	6,592.96	-5,977.04	3,293.14	14,425,195.69	1,698,136.91	39.72096940	-80.79472692	
12,200.00	89.00	150.00	6,594.71	-6,063.63	3,343.14	14,425,109.10	1,698,186.91	39.72073128	-80.79454983	
12,300.00	89.00	150.00	6,596.46	-6,150.22	3,393.13	14,425,022.51	1,698,236.90	39.72049317	-80.79437274	
12,400.00	89.00	150.00	6,598.21	-6,236.81	3,443.12	14,424,935.92	1,698,286.89	39.72025506	-80.79419566	
12,500.00	89.00	150.00	6,599.96	-6,323.40	3,493.12	14,424,849.33	1,698,336.89	39.72001694	-80.79401857	
12,600.00	89.00	150.00	6,601.71	-6,409.99	3,543.11	14,424,762.74	1,698,386.88	39.71977883	-80.79384149	
12,700.00	89.00	150.00	6,603.46	-6,496.58	3,593.10	14,424,676.16	1,698,436.88	39.71954071	-80.79366441	
12,800.00	89.00	150.00	6,605.21	-6,583.16	3,643.10	14,424,589.57	1,698,486.87	39.71930260	-80.79348733	
12,900.00	89.00	150.00	6,606.96	-6,669.75	3,693.09	14,424,502.98	1,698,536.86	39.71906448	-80.79331025	
13,000.00	89.00	150.00	6,608.71	-6,756.34	3,743.09	14,424,416.39	1,698,586.86	39.71882637	-80.79313317	
13,100.00	89.00	150.00	6,610.46	-6,842.93	3,793.08	14,424,329.80	1,698,636.85	39.71858825	-80.79295609	
13,200.00	89.00	150.00	6,612.21	-6,929.52	3,843.07	14,424,243.21	1,698,686.84	39.71835014	-80.79277901	
13,300.00	89.00	150.00	6,613.95	-7,016.10	3,893.07	14,424,156.62	1,698,736.84	39.71811202	-80.79260194	
13,400.00	89.00	150.00	6,615.70	-7,102.69	3,943.06	14,424,070.04	1,698,786.83	39.71787390	-80.79242487	
13,500.00	89.00	150.00	6,617.45	-7,189.28	3,993.05	14,423,983.45	1,698,836.83	39.71763579	-80.79224779	
13,600.00	89.00	150.00	6,619.20	-7,275.87	4,043.05	14,423,896.86	1,698,886.82	39.71739767	-80.79207072	
13,700.00	89.00	150.00	6,620.95	-7,362.46	4,093.04	14,423,810.27	1,698,936.81	39.71715955	-80.79189365	
13,800.00	89.00	150.00	6,622.70	-7,449.05	4,143.04	14,423,723.68	1,698,986.81	39.71692143	-80.79171658	
13,900.00	89.00	150.00	6,624.45	-7,535.64	4,193.03	14,423,637.09	1,699,036.80	39.71668332	-80.79153952	
14,000.00	89.00	150.00	6,626.20	-7,622.22	4,243.02	14,423,550.50	1,699,086.79	39.71644520	-80.79136245	
14,100.00	89.00	150.00	6,627.95	-7,708.81	4,293.02	14,423,463.92	1,699,136.79	39.71620708	-80.79118539	
14,102.92	89.00	150.00	6,628.00	-7,711.34	4,294.48	14,423,461.39	1,699,136.25	39.71620012	-80.79118021	

PBHL/TD 14102.92 MD/6628.00 TVD

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WV Department of Environmental Protection

47051 02038



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Weller 6 HM (C)
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 6 HM (C)	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)		
Weller 6HM LP - plan misses target center by 32.06usft at 6998.69usft MD (6503.68 TVD, -1546.36 N, 771.16 E) - Point	0.00	0.00	6,504.00	-1,555.62	740.47	14,429,617.11	1,695,584.24	39.73312767	-80.80377063
Weller 6HM BHL - plan hits target center - Point	0.00	0.00	6,628.00	-7,711.34	4,294.48	14,423,461.39	1,699,138.25	39.71620012	-80.79118021

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
1,700.00	1,700.00	0.00	0.00	KOP Begin 2°/100' build	
2,200.00	2,197.47	-42.04	-11.26	Begin 2°/100' build/turn	
2,933.66	2,911.51	-191.22	45.42	Begin 2°/100' build	
5,234.78	5,100.00	-735.94	502.50	Begin 2°/100' turn	
5,591.78	5,439.53	-832.30	554.67	Begin 18.00° tangent	
6,294.65	6,108.00	-1,040.15	617.69	Begin 10°/100' build	
7,004.65	6,503.82	-1,552.06	772.89	Begin 5°/100' turn	
7,267.30	6,508.43	-1,792.48	877.10	Begin 89.00° lateral section	
14,102.92	6,628.00	-7,711.34	4,294.48	PBHL/TD 14102.92 MD/6628.00 TVD	

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4705102038

WW-9
(4/16)

API Number 47 - 051 - _____
Operator's Well No. Waller 6HM

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 casing

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection (UIC Permit Number UIC 2459, UIC 985, 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 / WVD09185) and Westmoreland Sanitary Landfill, LLC (SAH 465 / PA DEPEC# 1369426)

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 27th day of March, 2018

Kaitlin McCawley

Notary Public

My commission expires 5/8/21



47051 02038

Form WW-9

Operator's Well No. Weller 6HM

Tug Hill Operating, LLC

Proposed Revegetation Treatment: Acres Disturbed 11.08 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: *Jessie A. ...*

Comments: _____

Title: Oil & Gas Inspector

Date: 3/28/18

Field Reviewed? Yes No

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APR 17 2018
WV Department of
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4705102038

WW-9

PROPOSED WELLER 6HM

SUPPLEMENT PG 1

DRAWING NOT TO SCALE

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.

FFQ INDUSTRIES, INC.
TM 28/5
1069 ACRES

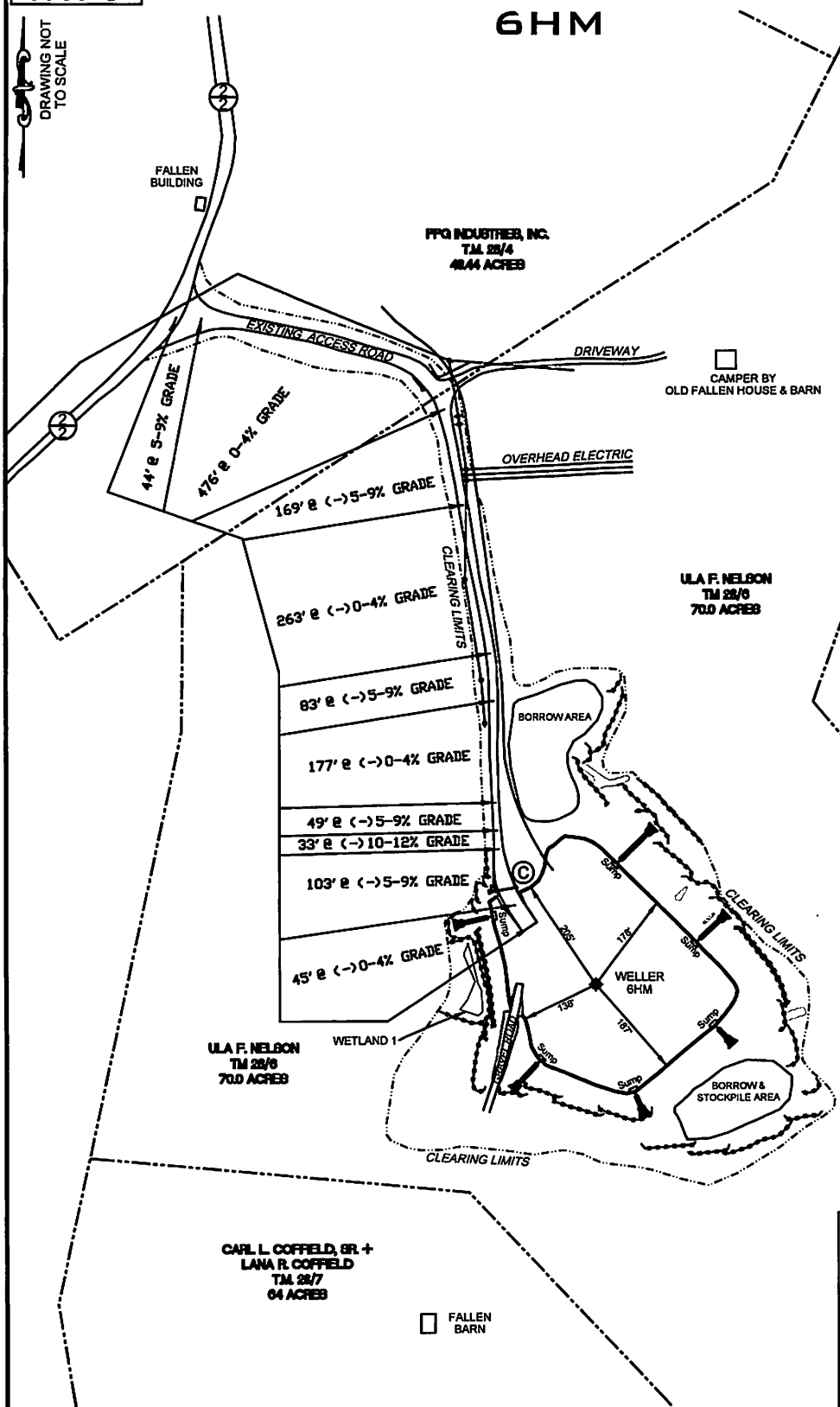
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WV Department of Environmental Protection

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



47 051 02038



JW
3/28/18

Well Site Safety Plan

Tug Hill Operating, LLC

Well Name:Weller 6HM

Pad Location: Weller ad

Marshall County, West Virginia

UTM meters , NAD83, Zone 17:

Northing:

4,398,630.24

Easting: 516,589.42

March 2018
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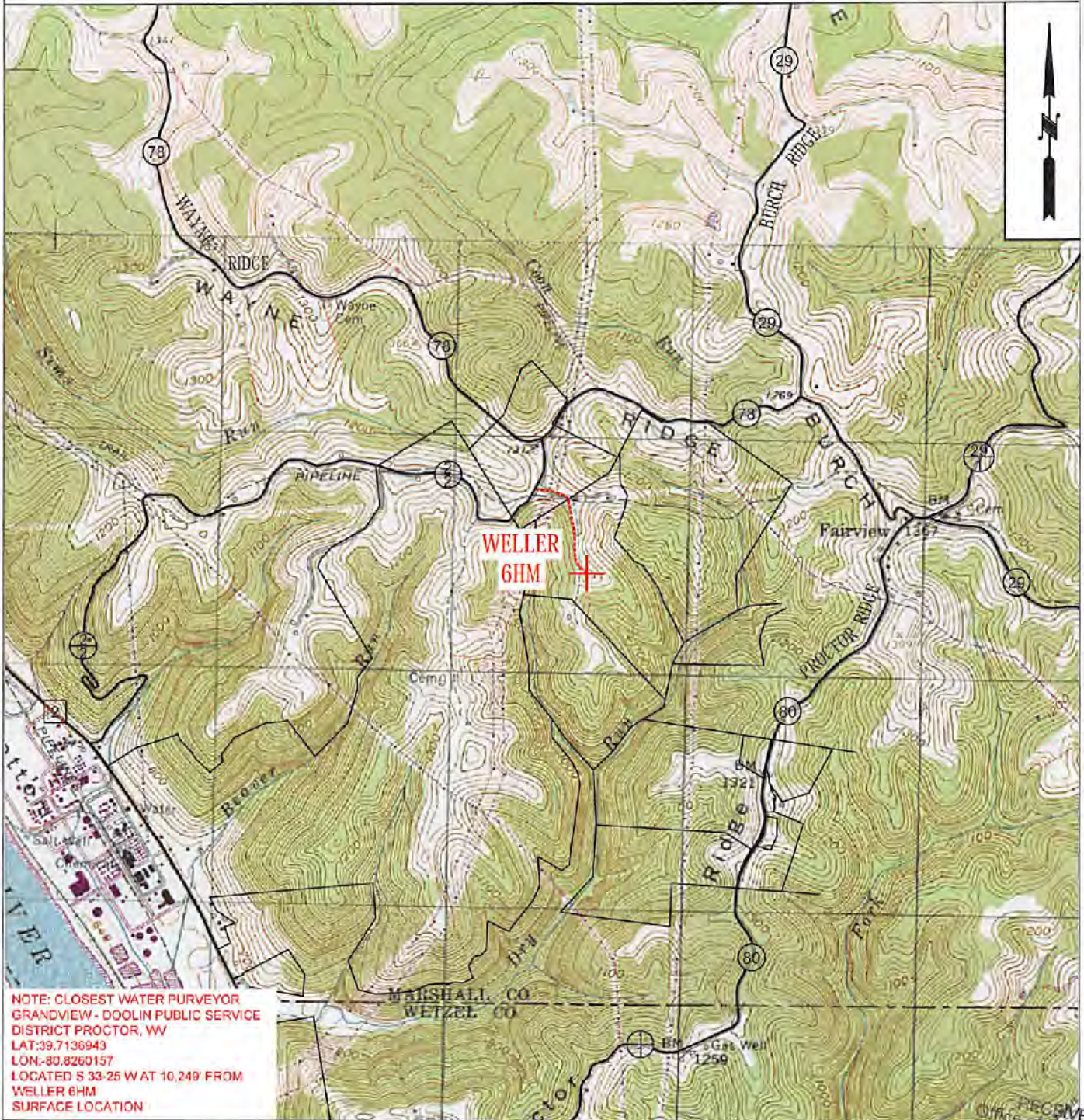
APR 17 2018

WV Department of
Environmental Protection

WW-9


PROPOSED WELLER 6HM

SUPPLEMENT PG 2



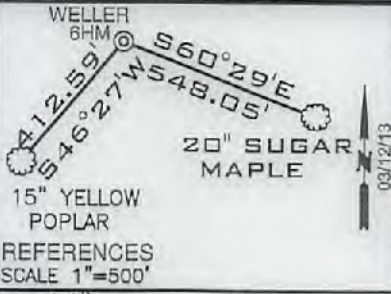
NOTE: CLOSEST WATER PURVEYOR
GRANDVIEW - DOOLIN PUBLIC SERVICE
DISTRICT PROCTOR, WV
LAT: 39.7136943
LON: -80.8260157
LOCATED S 33-25 W AT 10,249' FROM
WELLER 6HM
SURFACE LOCATION

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Office of Oil and Gas

 TUG HILL OPERATING	OPERATOR	494510851	TOPO SECTION	LEASE NAME	APR 17 2018
	TUG HILL OPERATING, LLC 380 SOUTHPOINTE BLVD SUITE 200 CANONSBURG, PA 15317		NEW MARTINSVILLE 7.5'	WELLER	
			SCALE: 1" = 2000'	DATE:	WV Department of Environmental Protection

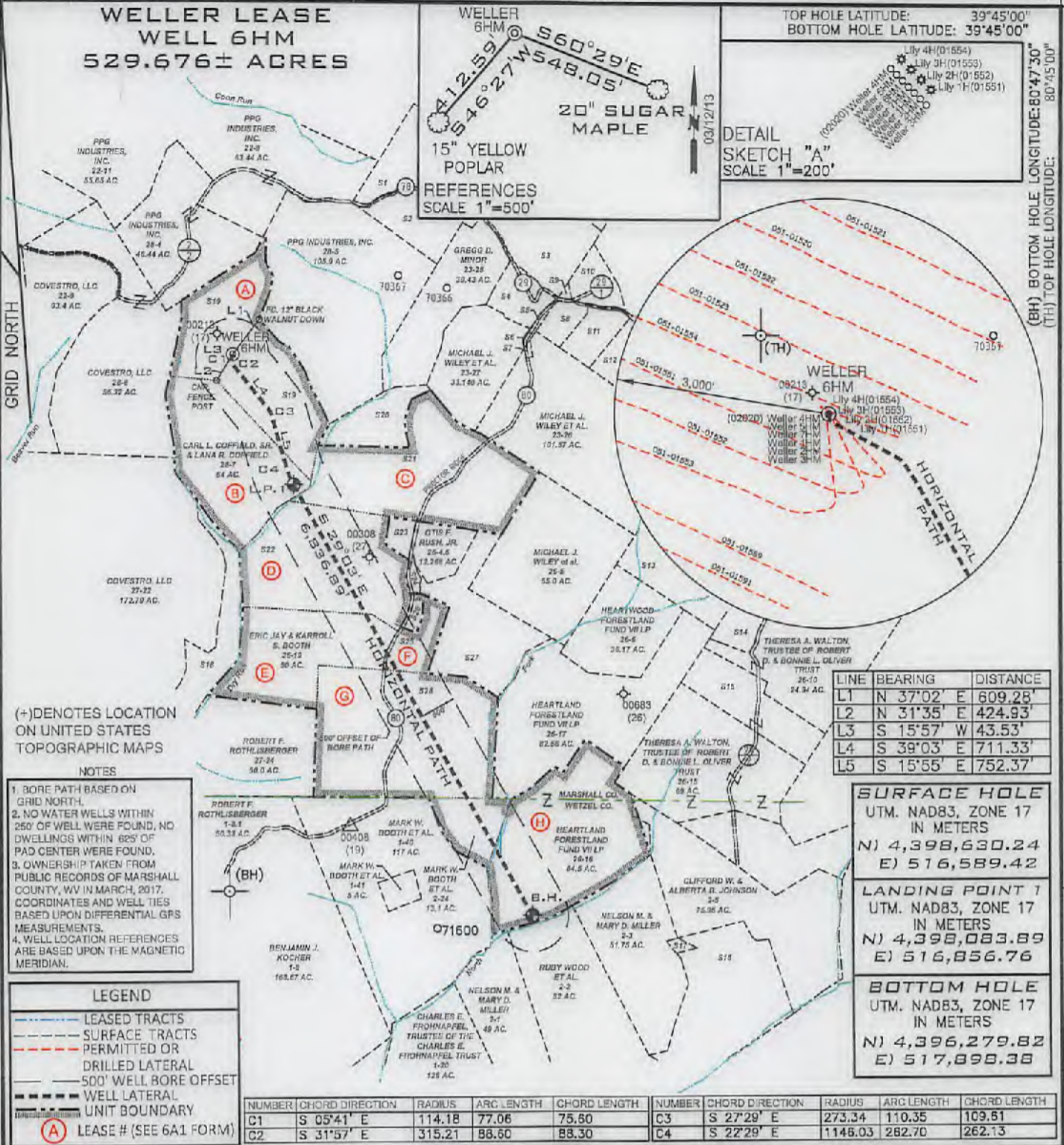
47051 02038

WELLER LEASE WELL 6HM 529.676± ACRES



TOP HOLE LATITUDE: 39°45'00"
BOTTOM HOLE LATITUDE: 39°45'00"

DETAIL SKETCH "A"
SCALE 1"=200'



(+) DENOTES LOCATION ON UNITED STATES TOPOGRAPHIC MAPS

- NOTES**
- BORE PATH BASED ON GRID NORTH.
 - NO WATER WELLS WITHIN 250' OF WELL WERE FOUND, NO DWELLINGS WITHIN 625' OF PAD CENTER WERE FOUND.
 - OWNERSHIP TAKEN FROM PUBLIC RECORDS OF MARSHALL COUNTY, WV IN MARCH, 2017. COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS.
 - WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.

LINE	BEARING	DISTANCE
L1	N 37°02' E	609.28'
L2	N 31°35' E	424.93'
L3	S 15°57' W	43.53'
L4	S 39°03' E	711.33'
L5	S 15°55' E	752.37'

SURFACE HOLE
UTM. NAD83, ZONE 17
IN METERS
N) 4,398,630.24
E) 516,589.42

LANDING POINT 1
UTM. NAD83, ZONE 17
IN METERS
N) 4,398,083.89
E) 516,856.76

BOTTOM HOLE
UTM. NAD83, ZONE 17
IN METERS
N) 4,396,279.82
E) 517,898.38

NUMBER	CHORD DIRECTION	RADIUS	ARC LENGTH	CHORD LENGTH	NUMBER	CHORD DIRECTION	RADIUS	ARC LENGTH	CHORD LENGTH
C1	S 05°41' E	114.18	77.06	75.50	C3	S 27°29' E	273.34	110.35	109.51
C2	S 31°57' E	315.21	88.60	88.30	C4	S 22°29' E	1146.03	282.70	262.13

FILE NUMBER _____

DRAWING NUMBER WELLER_WP_6HM

SCALE 1" = 2000'

MINIMUM DEGREE OF ACCURACY 1/200

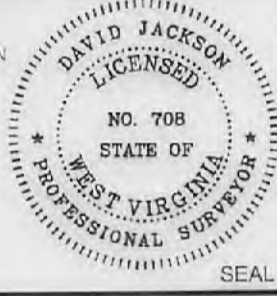
PROVEN SOURCE OF ELEVATION SUBMETER MAPPING GRADE GPS

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE RULES ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.S. 708

David L Jackson

JACKSON SURVEYING INC.
P.O. Box 1460
Clarksburg, WV 26302
304-823-5351



WVDEP
OFFICE OF OIL & GAS
601 57TH STREET, SE
CHARLESTON, WV 25304

DATE: MARCH 22, 2018

OPERATORS WELL NO. WELLER 6HM

API WELL NO. 47-051-02038

STATE WV COUNTY Marshall PERMIT 46A

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X

LOCATION ELEVATION 1273.0' WATERSHED (HUC 10) French Creek - Ohio River

DISTRICT Franklin COUNTY Marshall

QUADRANGLE New Martinsville 7 1/2' LEASE NUMBER SEE WW-6A1 Form

SURFACE OWNER Ula F. Nelson ACREAGE 70.0

OIL & GAS ROYALTY OWNER Ula F. Nelson LEASE ACREAGE 70.0

PROPOSED WORK: DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ___
PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE (SPECIFY) _____

TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD: 6,622' TMD: 14,113'

WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DIANNA STAMPER CT CORPORATION SYSTEM

ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 FORT WORTH, TX 76107 ADDRESS 5400 D BIG TYLER ROAD CHARLESTON, WV 25313

COUNTY NAME PERMIT

47051 02038

form wvc

**WELLER LEASE
WELL N-6HM
529.676± 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	22-1	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*



TUG HILL
OPERATING

OPERATOR'S
WELL #: Weller 6HM
DISTRICT: Franklin
COUNTY: Marshall
STATE: WV

WELL PLAT
PAGE 2 OF 2
DATE: 03/22/2018

WW-6A1
(5/13)

Operator's Well No. Weller 6HM

**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

Lease No.	Tags	Parcel	Lessor	Lessee	Royalty	Book	Page	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
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
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
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
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
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
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

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Lease No.	Tags	Parcel	Lessor	Lessee	Royalty	Book	Page	Assignment	Assignment	Assignment	Assignment	Assignment
10*14065	B	5-28-7	CARL L COFFIELD SR	GASTAR EXPLORATION USA, INC.	1/8+	665	363	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	C	5-26-2	MARK W BOOTH	GASTAR EXPLORATION INC	1/8+	836	110	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A	N/A	N/A
10*14917	C	5-26-2	EDWIN BOOTH ANDERSON	GASTAR EXPLORATION INC	1/8+	836	108	36/9 Gastar Exploration Inc to TH Exploration II, LLC	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A	N/A	N/A
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	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC merge SWN Production Company, LLC	41/256 SWN Production Company, 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	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC merge SWN Production Company, LLC	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
10*21935	E	5-26-19	KARROLL S & LOIS E BOOTH	AMERICAN PETROLEUM PARTNERS OPERATING, LLC	1/8+	940	493	41/224 American Petroleum Partners Operating, LLC to TH Exploration, LLC	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
10*22015	E	5-26-19	ERIC JAY BOOTH	AMERICAN PETROLEUM PARTNERS OPERATING, LLC	1/8+	942	217	41/224 American Petroleum Partners Operating, LLC to TH Exploration, LLC	N/A	N/A	N/A	N/A
10*19908	E	5-26-19	GOLDA K ANDERSON	TH EXPLORATION LLC	1/8+	945	434	N/A	N/A	N/A	N/A	N/A
10*17137	F	5-26-4.1	MARK E. SMITH VALERIE J. SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	685	521	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	41/256 SWN Production Company, LLC to TH Explorlation, LLC	N/A	N/A	N/A
10*17153	F	5-26-4.1	ALLEN SMITH & BARBARA SMITH	CHESAPEAKE APPALACHIA LLC	1/8+	687	46	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	41/256 SWN Production Company, LLC to TH Explorlation, LLC	N/A	N/A	N/A
10*19733	G	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
10*19910	G	5-26-18	GOLDA KATHLEEN BOOTH ANDERSON	TH EXPLORATION LLC	1/8+	945	440	N/A	N/A	N/A	N/A	N/A
10*21450	G	5-26-18	ERIC JAY BOOTH	TH EXPLORATION LLC	1/8+	953	258	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
10*21165	H	12-2-24	GARNET IRENE ROBINSON	TH EXPLORATION LLC	1/8+	198A	349	N/A	N/A	N/A	N/A	N/A
10*15090	H	12-2-24	GEORGE E BOOTH JR	GASTAR EXPLORATION USA, INC.	1/8+	152A	440	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A	N/A	N/A	N/A
10*15089	H	12-2-24	MAGGIE ANN ROCKWELL	GASTAR EXPLORATION USA, INC.	1/8+	152A	437	40/552 TH Exploration II, LLC to TH Exploration, LLC	N/A	N/A	N/A	N/A
10*15088	H	12-2-24	MARK W BOOTH	GASTAR EXPLORATION USA, INC.	1/8+	154A	122	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*21151	H	12-2-24	RICHARD KEITH REYNOLDS	TH EXPLORATION LLC	1/8+	198A	347	N/A	N/A	N/A	N/A	N/A
953928	I	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
953931	I	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

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Lease No.	Tags	Parcel	Lessor	Lessee	Royalty	Book	Page	Assignment	Assignment	Assignment	Assignment	Assignment
953930	I	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
953929	I	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
953913	I	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
WV-MAR-0287	I	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
WV-MAR-0287	I	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
953927	I	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

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MARSHALL County 01:22:38 PM
Instrument No 1403489
Date Recorded 04/27/2016
Document Type ASN
Pages Recorded 77
Book-Page 36-9
Recording Fee \$77.00
Additional \$13.00

WHEN RECORDED RETURN TO:
TH Exploration II, LLC
1320 South University Drive, Suite 500
Fort Worth, Texas 76107
Attn: David Kalish

Execution Version

ASSIGNMENT AND BILL OF SALE

STATE OF WV §
 § KNOW ALL MEN BY THESE PRESENTS:
COUNTY OF MARSHALL §

THIS ASSIGNMENT AND BILL OF SALE (this "*Assignment*"), dated April 7, 2016, but effective as of 7:00 A.M. Houston time on January 1, 2016 (the "*Effective Time*"), is between Gastar Exploration Inc., a Delaware corporation, whose address is 1331 Lamar Street, Suite 650 Houston, Texas 77010 ("*Assignor*"), and TH Exploration II, LLC, a Texas limited liability company, whose address is 1320 South University Drive, Suite 500, Fort Worth, Texas 76107 ("*Assignee*"). Assignor and Assignee are each, individually, referred to herein as a "*Party*" and, collectively, as the "*Parties*".

Capitalized terms used but not defined herein shall have the respective meanings set forth in that certain Purchase and Sale Agreement (the "*Purchase Agreement*"), dated as of February 19, 2016, by and between Assignor and Assignee (as successor-in-interest).

Section 1. Assignment. The conveyance and assignment herein shall be deemed effective as of the Effective Time.

For Ten Dollars (\$10.00) and other good and valuable consideration (the receipt and sufficiency of which are hereby acknowledged), Assignor does hereby forever GRANT, BARGAIN, SELL, CONVEY, ASSIGN, TRANSFER, SET OVER AND DELIVER unto Assignee, all of Assignor's right, title and interest in and to the following interests and properties (such right, title and interest described in subsections (a) through (k) of this Section 1, less and except the Excluded Assets, collectively, the "*Conveyed Interests*"):

(a) all oil, gas and/or mineral leases of Assignor, together with any and all other right, title and interest of Assignor in and to the leasehold estates created thereby, including subleases, royalties, overriding royalties, net profits interest, carried interests or similar rights or interests in such leases, and together with all rights, privileges, benefits and powers conferred upon Assignor with respect to the use and occupation of the lands covered thereby that may be necessary, convenient or incidental to the possession and enjoyment of such leases, located in Marshall, Wetzell, Doddridge, Harrison, Lewis, Marion, and Monongalia Counties, West Virginia and Greene, Butler, Fayette, Somerset, and Clearfield Counties, Pennsylvania, including those described on Exhibit A—Part 1 attached hereto (subject to any reservations, limitations or depth restrictions described on Exhibit A—Part 1), (Assignor's interest in such leases and other right, title and interest as so limited, the "*Leases*");

(b) all rights and interests in, under or derived from all unitization agreements in effect with respect to any of the Leases and the units created thereby, including those described

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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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DPS LAND SERVICES CORP
5000 TOWN CENTER BOULEVARD, SUITE 145
CANONSBURG PA 15317-5841

BOOK 0041 PAGE 0224

STATE OF WEST VIRGINIA §
 §
COUNTY OF MARSHALL §

Marshall County
Jan Pest, Clerk
Instrument 1436500
02/14/2018 @ 01:32:11 PM
ASSIGNMENTS
Book 41 @ Page 224
Pages Recorded 7
Recording Cost \$ 13.00

ASSIGNMENT AND CONVEYANCE

THIS ASSIGNMENT AND CONVEYANCE (the "Assignment") is made and entered into this 5th day of February, 2018, and made effective December 12, 2017 (the "Effective Date"), by and between **AMERICAN PETROLEUM PARTNERS OPERATING, LLC**, (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 December 12, 2017 (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.

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

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STATE OF WEST VIRGINIA §
 §
COUNTY OF MARSHALL §

Marshall County
Jan Pest, Clerk
Instrument 1438635
04/06/2018 @ 12:17:52 PM
ASSIGNMENTS
Book 41 @ Page 380
Pages Recorded 7
Recording Cost \$ 13.00

ASSIGNMENT AND CONVEYANCE

THIS ASSIGNMENT AND CONVEYANCE (the "**Assignment**") is made and entered into this 5th day of April, 2018, and made effective December 12, 2017 (the "**Effective Date**"), by and between **AMERICAN PETROLEUM PARTNERS OPERATING, LLC**, (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 December 12, 2017 (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.

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

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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.

J.K

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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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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*").

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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

47 05 102038

April 13, 2018

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

RE: Weller 6HM

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 6HM 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 - 02038
Operator's Well No. Waller 6HM
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	Easting: <u>516,589.42</u>
County: <u>Marshall</u>		Northing: <u>4,388,630.24</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="margin-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 style="text-align: center;">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:

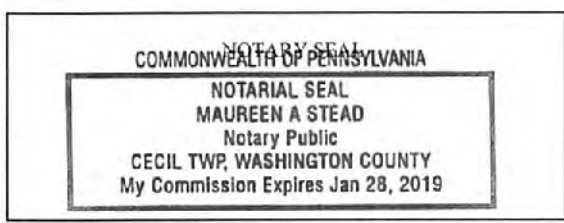
The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication 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 personal service, 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 - 02038
OPERATOR WELL NO. Weller 6HM
Well Pad Name: Lily

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

4705102038

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 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

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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 as 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.**

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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APR 17 2018
WV Department of
Environmental Protection

WW-6A
(8-13)

API NO. 47- 051 - 02038
OPERATOR WELL NO. Weller 6HM
Well Pad Name: Lily

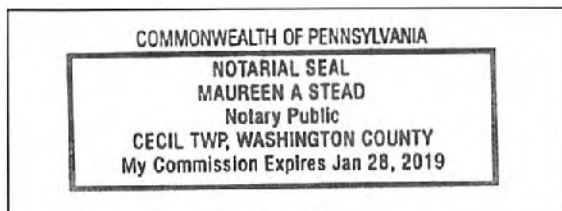
Notice is hereby given by:

Well Operator: Tug Hill Operating, LLC
Telephone: 724-749-6388
Email: amiller@tug-hill.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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Environmental Protection

47 051 02038

WW-6A Notice of Application Attachment

Weller 6HM

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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47051 02038

WW-6A

Supplement Pg. 1A

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

WATER WELL REPORT

Well: WELLER No. 6HM
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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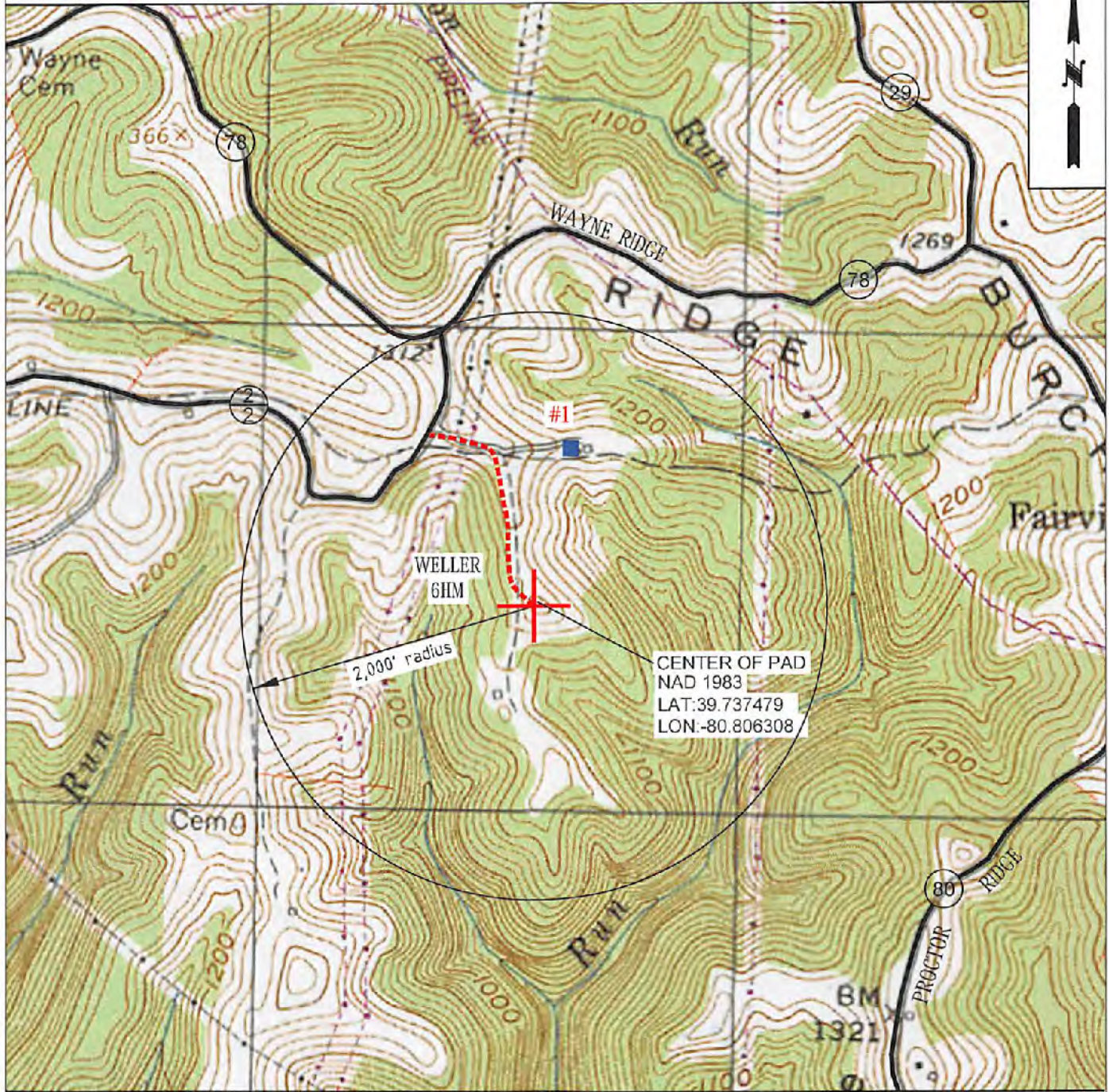
47 051 02038

WW-6A

PROPOSED WELLER 6HM

SUPPLEMENT PG 1

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



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 RECEIVED
 WELLER
DATE: APR 17 2018
 DATE: 4/17/2018
 Department of Environmental Protection

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:** 12/26/2017

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
Danver, CO 80227

Name: Carl L. Coffield, Sr. and Lana R. Coffield (Pad and Access Road)
Address: 970 Allendale Avenue
Akron, OH 44038

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: West Virginia
County: Marshall
District: Franklin
Quadrangle: New Martinsville 7.5'

Approx. Latitude & Longitude: 39.7374506; -80.8064532
Public Road Access: Wells Hill Road - County Route 2/2
Watershed: HUC-10: Franch Creek - Ohio River
Generally used farm name: Nelson, Ula F.

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-op.com

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

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47051 02038

WW-6A3 Attachment

Weller 6HM

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
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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 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: 724-745-8388

Email: amiller@tug-hillop.com

Address: 360 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317

Facsimile: 724-336-2030

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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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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)

- | | |
|--|-------------------------------|
| <input checked="" type="checkbox"/> CERTIFIED MAIL | <input type="checkbox"/> 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 44036

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>516,589.42</u>
County: <u>Marshall</u>		Northing: <u>4,398,630.24</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-hill-op.com

Address: 380 Southpointe Boulevard, Plaza II, Suite 300
Canonsburg, PA 15317
Facsimile: 724-338-2030

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47 05 102038

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 6HM 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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TUG HILL

47 05 7 02 03 8

PLANNED ADDITIVES TO BE USED IN FRACTURING OR STIMULATION

Well No. Weller 6HM

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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Well Site

Construction Plan, &
 Equipment Control Plans
 Operating
 Marshall County
 in 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: 1-878-632-3400

Property Owner Information - Lily Well Site

Fremont Partners - Marshall County	
Parcel	Area (Acres)
Parcel 1	4.84
Parcel 2	2.00
Parcel 3	3.80
Parcel 4	6.24
Subtotal	16.88

Access Road		
Surface Owner	MA - Parcel	Road Length
Parcel 1	34.4	481.11'
Parcel 2	3.4	481.11'
Subtotal	37.8	1162.22'

Distributed Area

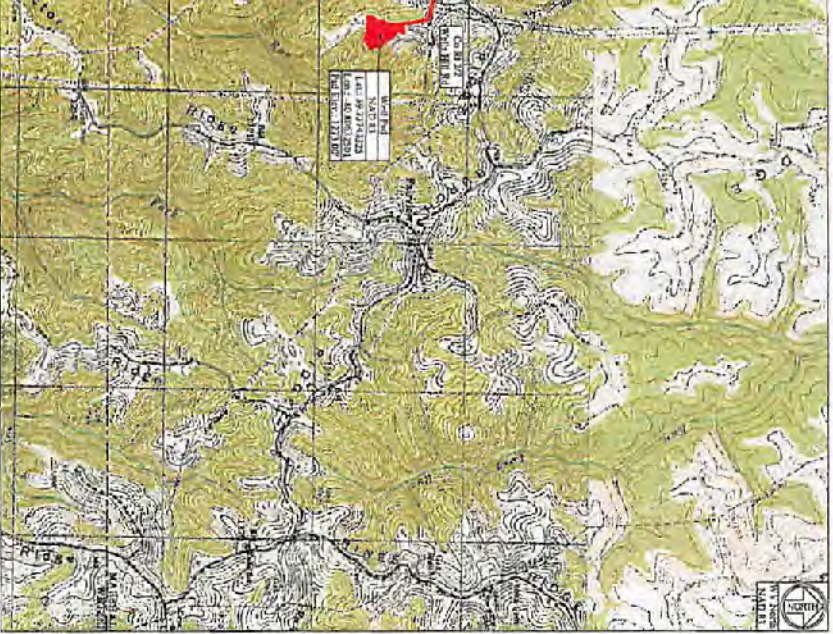
Well Field	Area (Acres)
Well Field 1	4.84 Ac
Access Road Construction	1.17 Ac
Other	NA
Surface Area	0.37 Ac
Total	6.38 Ac

Note: 1/4" = 50 Feet Contour Interval
 North Arrow, NAD 83
 Elevations Based on NAVD83
 Surveyed by Jerry Craig UPS
 and Chris Peck Consulting
 M.A.D.I.

Note:
 All proposed wells will be within the existing Tug Hill of Development for the Lily Well Site. No additional surface disturbance will take place outside of the existing LUD. Additional erosion and sedimentation controls will be mandated within the LUD. All earthwork disturbances shall take place within the existing LUD. The existing access road to the site shall be used and no additional access roads will be necessary for the site modifications.

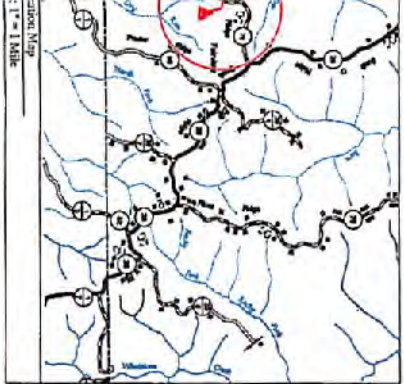
Lily Well Site Quantities

Disturbance	Ord (Cu Yd)	Fill (Cu Yd)	Spill (Cu Yd)	Storm (Cu Yd)	Exc. (Cu Yd)	Imp. (Cu Yd)	Imp. (Cu Yd)
Well Field	1,887.13	NA	NA	NA	NA	NA	NA
Well Field Access Road MA	7.21	17,528	188.31	16,316	14,816	1,728	NA
Well Field Access Road MA	3.30	31,119	309.29	30,297	13,016	122.38	NA
Stormwater Area	2,595.91	NA	1,858.01	2,381.41	NA	NA	NA
Subtotal	5,586.55	3,500.0	3,945.32	3,819.61	14,816	122.38	NA



Site Location (NAD 83)

State	Latitude (DD)	Longitude (DD)
Marshall County	39.73743325	-80.80632501
Center of Well Field	39.7370223	-80.8053581



Signature
 2/5/18

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 WV Department of
 Environmental Protection



The drawings, annotations, notes and figures of approval contained herein have been prepared by me or under my direct supervision and I am a duly Licensed Professional Engineer in the State of West Virginia. I am duly Licensed as a Professional Engineer in the State of West Virginia. I am duly Licensed as a Professional Engineer in the State of West Virginia. I am duly Licensed as a Professional Engineer in the State of West Virginia. I am duly Licensed as a Professional Engineer in the State of West Virginia.

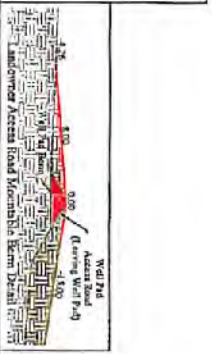
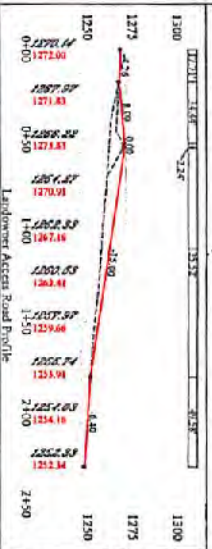
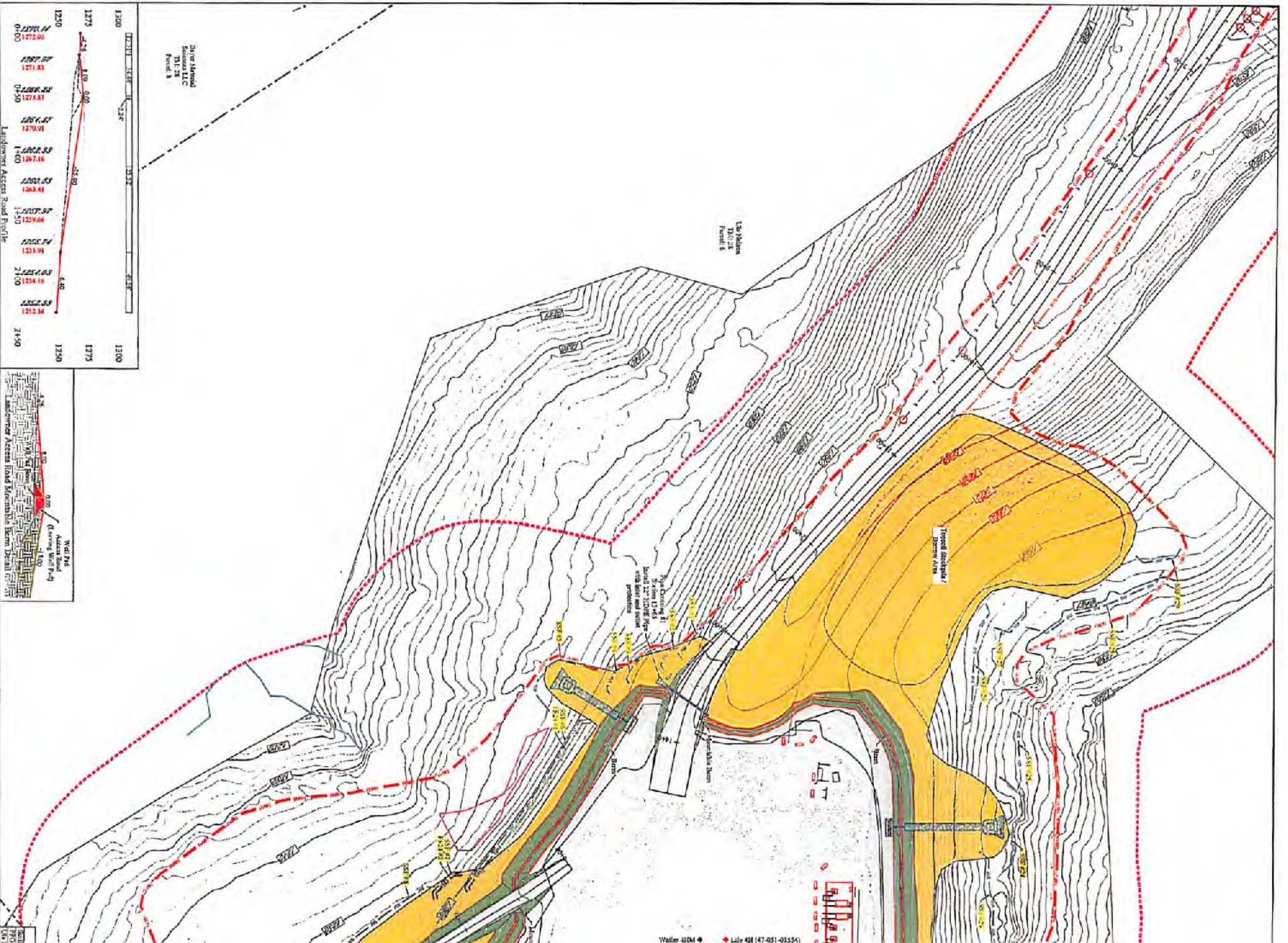
Sheet	Description
1	Cover Sheet
VI	Schedule of Quantities
VI-A3	Site Notes
2	Original Ground Site Conditions
3	Pre-Construction Site Conditions
4	Site Construction
5	Crushing Exhibit
6	Overall Plan View
7-8	E&S Plan View
9	Top Key Exhibit
10-11	Plan View
12	Cross Sections - Well Pad
13	Cross Sections - Access Roads
DI-G2	Construction Exhibit
1	Construction Detail
SI	Site Rectification
MI-A5	Erosion and Sediment Control Details
DI-D2	Erosion and Sediment Control Details
RI	Access Road Details

Cover Sheet
Lily Well Site
 Franklin District
 Marshall County, WV

Draw: 1/2/2017
 Design: As Shown
 Drawn By: ZS
 File No.
 Sheet 1 of 13

THIS DOCUMENT
 PREPARED FOR
**TUG HILL
 OPERATIONS**

Date	Revision
12-28-2017	Design



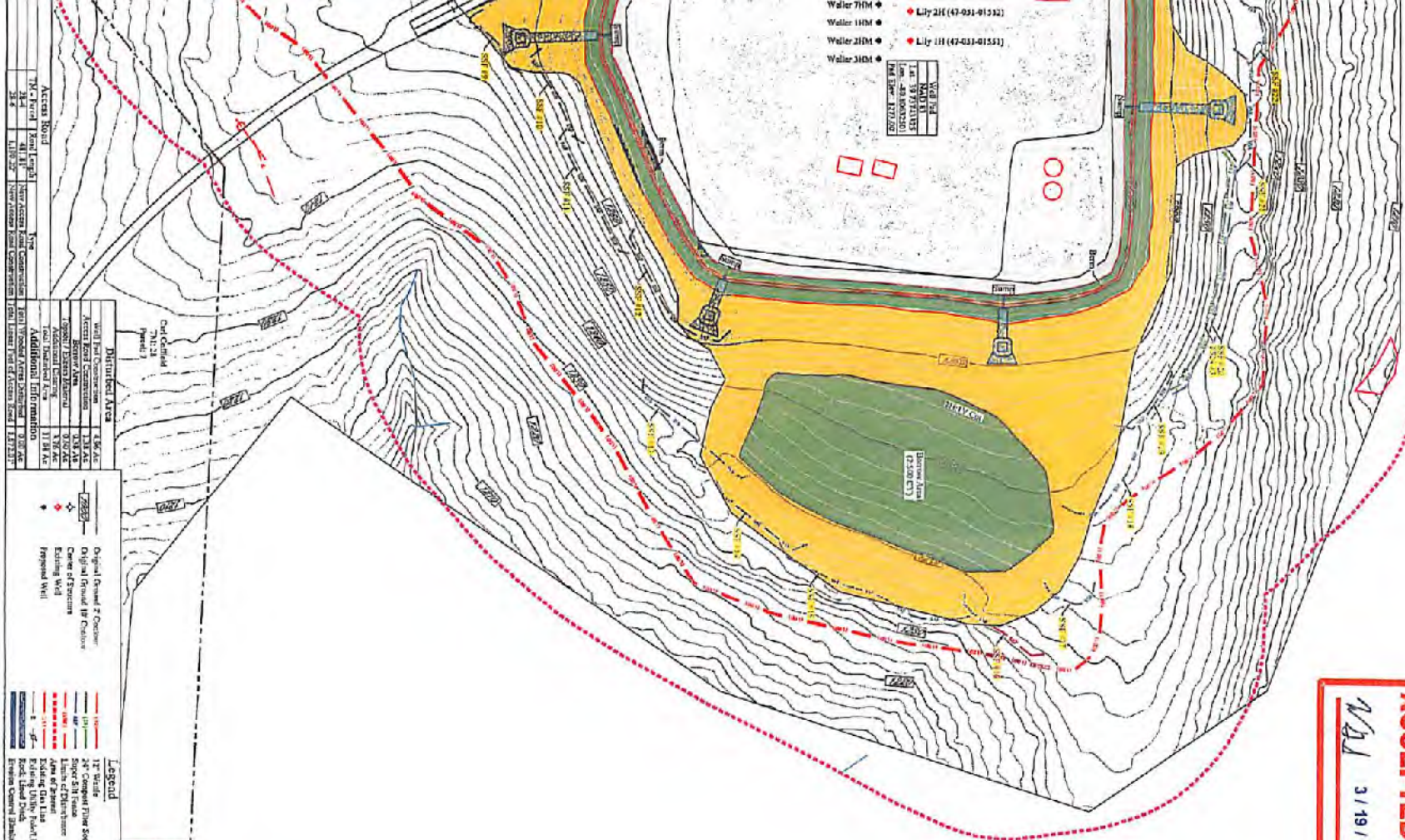
124 Nelson
TUG HILL
Parcel 4

Lily Well Site
Tug Hill Operating
Exhibit A: Final Design: Issue for Permitting



**WVDEP OOG
ACCEPTED AS-BUILT**

WJN 3/19/2018



- Well 7H4 ● Lily 2H (47-031-01532)
- Well 1H4 ● Lily 1H (47-031-01531)
- Well 2H4 ● Lily 1H (47-031-01531)
- Well 3H4 ● Lily 1H (47-031-01531)

Well 7H4	1.4'	19/11/13
Well 1H4	1.4'	19/11/13
Well 2H4	1.4'	19/11/13
Well 3H4	1.4'	19/11/13

Access Road	Start Length	End Length	Type
34	411.17'	1139.27'	Proposed
35	1139.27'	1139.27'	Proposed

District Area	Well	Start Length	End Length
1.56 AC	Well 7H4	1.4'	19/11/13
	Well 1H4	1.4'	19/11/13
1.56 AC	Well 2H4	1.4'	19/11/13
	Well 3H4	1.4'	19/11/13

Original Ground 2' Contour	1:2500
Original Ground 10' Contour	1:1000
Existing Well	Circle with center
Proposed Well	Circle with center

Legend	1" - 10' Slope	10' - 20' Slope	20' - 30' Slope	30' - 40' Slope	40' - 50' Slope	50' - 60' Slope	60' - 70' Slope	70' - 80' Slope	80' - 90' Slope	90' - 100' Slope	100' - 150' Slope
1" - 10' Slope	10' - 20' Slope	20' - 30' Slope	30' - 40' Slope	40' - 50' Slope	50' - 60' Slope	60' - 70' Slope	70' - 80' Slope	80' - 90' Slope	90' - 100' Slope	100' - 150' Slope	150' - 200' Slope

NOTE:
All elevation readings shown herein are based on "vertical
evidence" evidence with respect to grade OGS readings.

RECEIVED
Office of Oil and Gas
APR 17 2018
WV Department of
Environmental Protection

Date:	12/28/2017
Revision:	Design

Erosion and Sediment Control Plan
Lily Well Site
Franklin District
Marshall County, WV

Kelly Surber
Professional Engineer
No. 12421

THIS DOCUMENT
PREPARED FOR
TUG HILL
OPERATING

Date:	12/28/2017
Sheet:	EA-SHOW
Designed By:	ZS
File No.:	
Sheet 8 of 13	