



west virginia department of environmental protection

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

Jim Justice , Governor  
Austin Caperton , Cabinet Secretary  
www.dep.wv.gov

Monday, January 23, 2017  
WELL WORK PERMIT  
Horizontal 6A / New Drill

TUG HILL OPERATING, LLC (A)  
1320 SOUTH UNIVERSITY DRIVE, SUITE 500

FORT WORTH , TX 76107

Re: Permit approval for GREER 1S-2HM  
47-051-01887-00-00

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

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

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin  
Chief

Operator's Well Number: GREER 1S-2HM  
Farm Name: PPG INDUSTRIES, INC.  
U.S. WELL NUMBER: 47-051-01887-00-00  
Horizontal 6A / New Drill  
Date Issued: 1/23/2017

Promoting a healthy environment.

01/27/2017

# 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

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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.

WW-6B  
(04/15)

4705101887  
API NO. 47-051 -  
OPERATOR WELL NO. Greer 1S-2HM  
Well Pad Name: Greer

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    Powhatan Point 7  
Operator ID    County    District    Quadrangle

2) Operator's Well Number: Greer 1S-2HM    Well Pad Name: Greer

3) Farm Name/Surface Owner: PPG Industries, Inc.    Public Road Access: Waynes Ridge Rd. - County Route 78

4) Elevation, current ground: 1,272'    Elevation, proposed post-construction: 1,251'

5) Well Type (a) Gas  Oil \_\_\_\_\_ Underground Storage \_\_\_\_\_

Other \_\_\_\_\_

(b) If Gas Shallow  Deep \_\_\_\_\_

Horizontal

6) Existing Pad: Yes or No No

*JL 10/27/16*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus is the target formation at a depth of 6350' - 6406', thickness of 56' and anticipated pressure of approx. 3800 psi

8) Proposed Total Vertical Depth: 6,506'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 13,094'

11) Proposed Horizontal Leg Length: 6,252'

12) Approximate Fresh Water Strata Depths: 70', 860'

13) Method to Determine Fresh Water Depths: Offset well reports or noticeable flow at the flowline or when need to start soaping

14) Approximate Saltwater Depths: 1,740'

15) Approximate Coal Seam Depths: Sewickly Coal - 756' and Pittsburgh Coal - 850'

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

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

(a) If Yes, provide Mine Info: Name: \_\_\_\_\_

Depth: \_\_\_\_\_

Seam: \_\_\_\_\_

Owner: \_\_\_\_\_

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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'	259FT^3(CTS)
Fresh Water	13 3/8"	NEW	H40	48#		1,000'	1045ft^3(CTS)
Coal	13 3/8"	NEW	H40	48#		1,000'	1045ft^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#		2,602'	851ft^3(CTS)
Production	5 1/2"	NEW	P110	20#		13,094'	3349ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#		6,042'	
Liners							

*ju 10/27/16*

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	1,730	1,384	SEE #24	1.2
Coal	13 3/8"	17.5"	.33	1,730	1,384	SEE#24	1.2
Intermediate	9 5/8"	12 1/4"	.352	3,520	2,816	SEE#24	1.33
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			

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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 15,105,000 lb proppant and 236,742 bbl of water. Max rate = 80 bpm; max psi = 9,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 17.78 Acres

22) Area to be disturbed for well pad only, less access road (acres): 5.38 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:

Sfc - Premium NE-1 + 2 CaCl; Int - Premium NE-1 + 1 CaCL + .25 lb/sk Cello Flake + .25 BA-10A + .75 gals/100sk FP-13L; Prod - Lead: 50:50 (Poz:Premium NE-1) + .2 R-3 + .2 MPA-170 + .75 gal/100sk FP-13L  
Tail: Premium NE-1 + .5 R-3 + .1 ASA-301 + .25 MPA-170 + .35 BA-10A + .75 gal-100sk FP-13L + 60 lb/sk ASCA-1  
\*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

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\*Note: Attach additional sheets as needed.

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WW6B Attachment to #24.

**Conductor and Surface Casing Cement:**

*Premium NE-1 + 2% CaCl*

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

**Intermediate Casing:**

*Premium NE-1 + 1% CaCl + .25 lb/sk Cello Flake + .25% BA-10A + .75 gals/100sk FP-13L*

- Premium NE-1 – Class A Portland API spec
- CaCl – Calcium Chloride
- Cello Flake – Fluid Loss Preventer
- BA-10A – Bonding Agent
- FP-13L – Anti-Foaming Agent

**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 + .5% R-3 + .1% ASA-301 + .25% MPA-170 + .35% BA-10A + .75 gal-100sk FP-13L + 60 lb/sk ASCA-1*

- 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

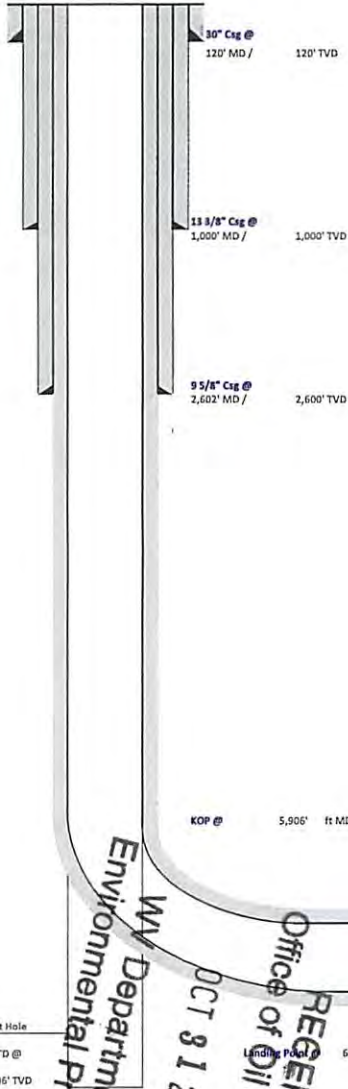
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WELL NAME:	Greer 15-2HM		
STATE:	WV	COUNTY:	Marshall
DISTRICT:			
DF Elev:	1276 ft	GL Elev:	1251 ft
TD:	13,094'		
TH Latitude:	39.75699174		
TH Longitude:	-80.83635533		
BH Latitude:	39.73968551		
BH Longitude:	-80.82734859		

*ju 10/25/16*



FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	860'
Sewickley Coal	756'
Pittsburgh Coal	850'
Big Lime	1,936'
Weir Sandstone	2,325'
Berea Sandstone	2,515'
Gordon Sandstone	2,875'
Rhinestreet Shale	5,772'
Genesee Shale	6,290'
Tully Limestone	6,304'
Hamilton Shale	6,318'
Marcellus Shale	6,350'
Landing Depth	6,376'
Onondaga	6,406'
Pilot Hole TD	6,506'

CASING SUMMARY							
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Depth (TVD)	Weight (lb/ft)	Grade	Top of Cement
Conductor	36	30	120'	120'	BW	BW	Surface
Surface	17.5	13.375	1,000'	1,000'	48	H40	Surface
Intermediate 1	12 1/4	9 5/8	2,602'	2,600'	36	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	13,094'	6,485'	20	P110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	338	A	15.6	Air	None
Surface	1,052	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	554	A	15	Air	1 Centralizer every other jt
Production	2,954	A	14.5	Air / SOBMM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc

Pilot Hole PH TD @ 6,506' TVD

Lateral TD @ 13,094' ft MD, 6,485' ft TVD

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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](mailto:dducoeur@dpslandservices.com) DPS GIS (7/15/2016) 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


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Permit well - Greer 1S-2HM  
Wells within 500' Buffer

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

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
4705101757	Tug Hill Operating	14668' MD	Marcellus	None	Yes	This is an offset planned Marcellus well. This well will be drilled and fracture stimulated contemporaneously with the Greer 1S-2HM
4705101758	Tug Hill Operating	14420' MD	Marcellus	None	Yes	This is an offset planned Marcellus well. This well will be drilled and fracture stimulated contemporaneously with the Greer 1S-2HM
4705170385	Unknown	Unknown	Unknown	Unknown	Unknown but unlikely. Probably an old shallow well	Old well, records are incomplete, see below for record on WVGES website



[Table Descriptions](#)  
[County Code Translations](#)  
[Permit Numbers Series](#)  
[License Notes](#)  
[Contact Information](#)  
[Disclaimer](#)  
[WVGES Main](#)  
[Pipeline-Plus New](#)

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

Enter Permit #: 70385

Location     Production     Plugging  
 Owner/Completion     Stratigraphy     Sample  
 Pay/ShowWater     Logs     Btm Hole Loc

Get Data    Reset

---

WV Geological & Economic Survey: **Well: County = 51 Permit = 70385** Report Time: Monday, October 24, 2016 1:59:29 PM

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4705170385	Marshall	70385	Franklin	New Martinsville	New Martinsville	39.749641	-80.635213	514117.4	4399953.4

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	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4705170385	J-L		unknown	Pirby Map Indiana Volt						unknown			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	G_BEF	G_AFT	O_BEF	O_AFT	NGL_BEF	NGL_AFT	P_BEF	P_AFT
4705170385	J-L							unclassified	unclassified	not available	unknown	unknown											

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 Stratigraphy data for this well

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

There is no Plugging data for this well

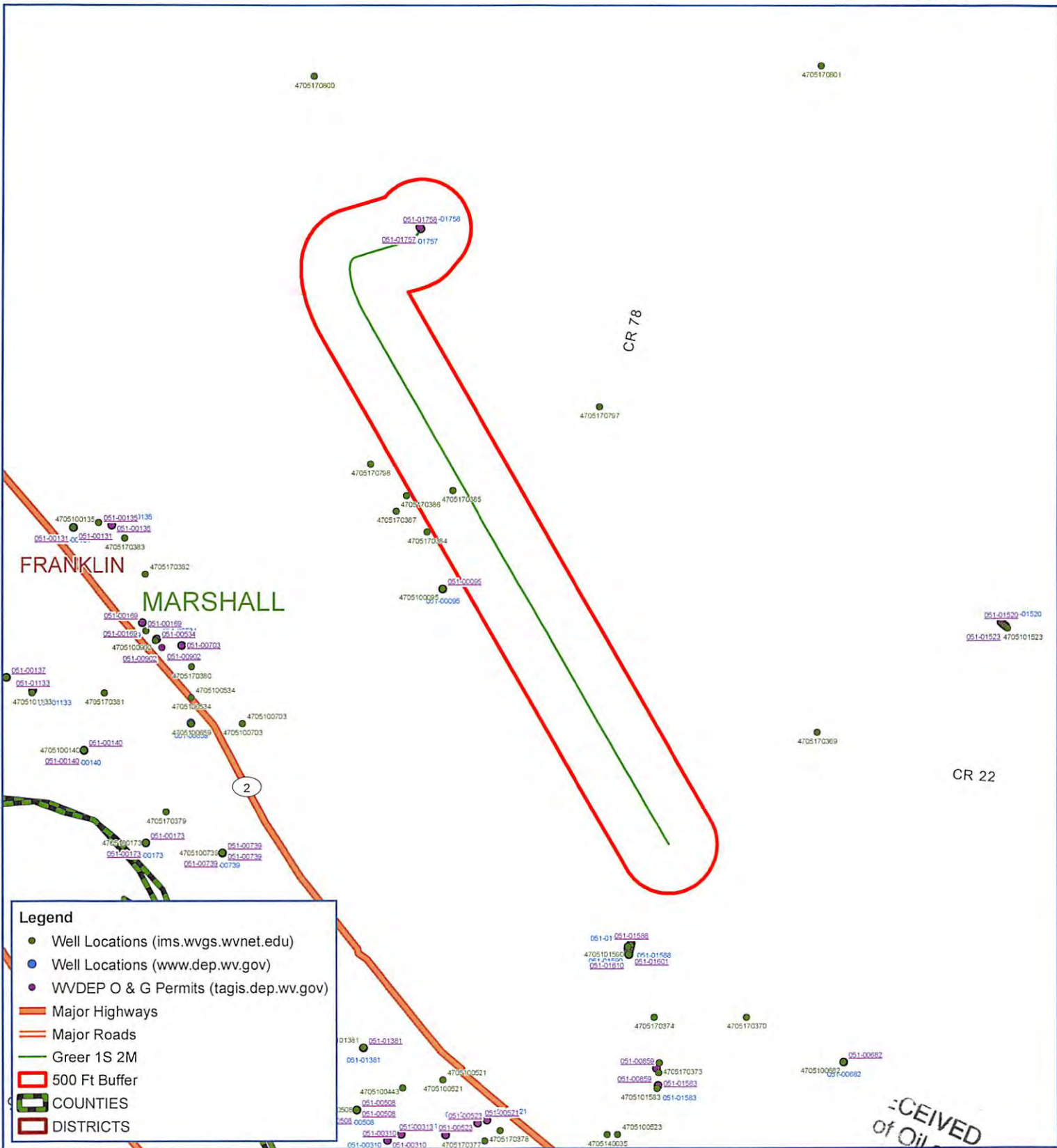
There is no Sample data for this well

5.11. Area of Review-- The permittee shall review the area surrounding the proposed well pad so as to identify and evaluate potential conduits for unintended fracture propagation, a report of which the permittee shall provide to the Office with the application for well work. All existing active, plugged, abandoned, and undocumented wells within a five hundred feet (500') radius of the surface location of the well that is the subject of the new application and within a five hundred feet (500') radius of the lateral section of the wellbore shall be considered for the potential of unintended fracture propagation. The report shall detail those wells that are known or reasonably expected to penetrate a depth that could be within the range of the fracture propagation. The detail shall include at a minimum the API number, operator name, total depth, perforated formation(s) and producing zones not perforated.

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- Legend**
- Well Locations (ims.wvgs.wvnet.edu)
  - Well Locations (www.dep.wv.gov)
  - WVDEP O & G Permits (tagis.dep.wv.gov)
  - Major Highways
  - Major Roads
  - Greer 1S 2M
  - 500 Ft Buffer
  - COUNTIES
  - DISTRICTS



## Greer 1S-2HM Franklin District Marshall County, WV



Notes:

All locations are approximate and are for visualization purposes only.

Map Created: September 15, 2016  
Map Current As Of: September 15, 2016

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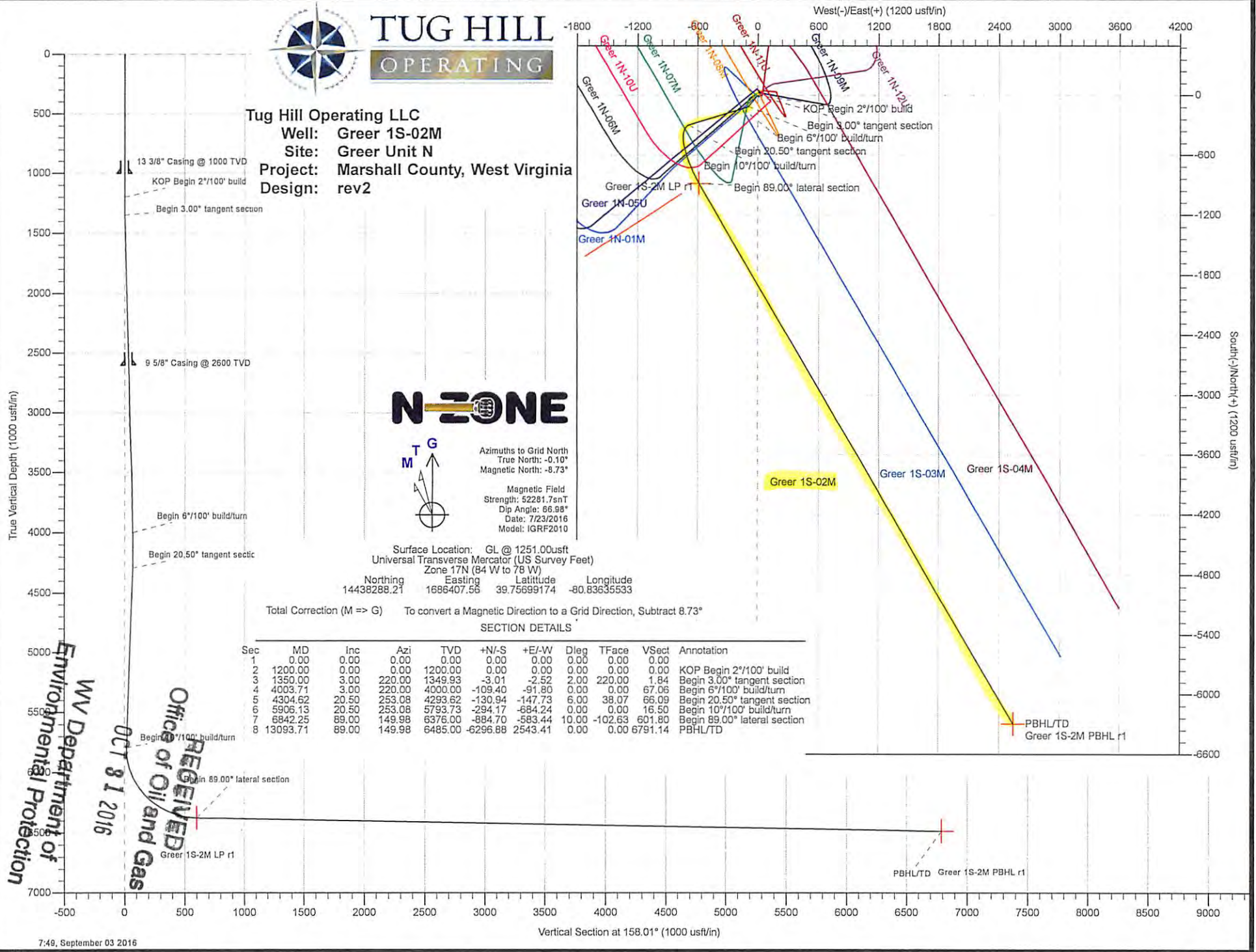
Map prepared by:  
**PS**  
LAND SERVICES

01/27/2017



# TUG HILL OPERATING

Tug Hill Operating LLC  
 Well: Greer 1S-02M  
 Site: Greer Unit N  
 Project: Marshall County, West Virginia  
 Design: rev2



## N-ZONE



Azimuths to Grid North  
 True North: -0.10°  
 Magnetic North: -8.73°  
 Magnetic Field  
 Strength: 52281.7snT  
 Dip Angle: 66.98°  
 Date: 7/23/2016  
 Model: IGRF2010

Surface Location: GL @ 1251.00ust  
 Universal Transverse Mercator (US Survey Feet)  
 Zone 17N (84 W to 78 W)  
 Northing 14438288.21 Easting 1686407.56 Latitude 39.75699174 Longitude -80.83635533

Total Correction (M => G) To convert a Magnetic Direction to a Grid Direction, Subtract 8.73°

### SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2°/100' build
3	1350.00	3.00	220.00	1349.93	-3.01	-2.52	2.00	220.00	1.84	Begin 3.00° tangent section
4	4003.71	3.00	220.00	4000.00	-109.40	-91.80	0.00	0.00	67.06	Begin 6°/100' build/turn
5	4304.62	20.50	253.08	4293.62	-130.94	-147.73	6.00	38.07	66.09	Begin 20.50° tangent section
6	5906.13	20.50	253.08	5793.73	-234.17	-684.24	0.00	0.00	16.50	Begin 10°/100' build/turn
7	6842.25	89.00	149.98	6376.00	-884.70	-583.44	10.00	-102.63	601.80	Begin 89.00° lateral section
8	13093.71	89.00	149.98	6485.00	-6296.88	2543.41	0.00	0.00	6791.14	PBHL/TD

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Planning Report - Geographic

<b>Database:</b>	DB Jul2216dt	<b>Local Co-ordinate Reference:</b>	Well Greer 1S-02M
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL @ 1251.00usft
<b>Project:</b>	Marshall County, West Virginia	<b>MD Reference:</b>	GL @ 1251.00usft
<b>Site:</b>	Greer Unit N	<b>North Reference:</b>	Grid
<b>Well:</b>	Greer 1S-02M	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev2		

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

<b>Site</b>	Greer Unit N				
<b>Site Position:</b>		<b>Northing:</b>	14,438,281.73 usft	<b>Latitude:</b>	39.75697400
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,686,396.99 usft	<b>Longitude:</b>	-80.83639300
<b>Position Uncertainty:</b>	0.00 usft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.10 °

<b>Well</b>	Greer 1S-02M					
<b>Well Position</b>	<b>+N/-S</b>	0.00 usft	<b>Northing:</b>	14,438,288.21 usft	<b>Latitude:</b>	39.75699174
	<b>+E/-W</b>	0.00 usft	<b>Easting:</b>	1,686,407.56 usft	<b>Longitude:</b>	-80.83635533
<b>Position Uncertainty</b>		0.00 usft	<b>Wellhead Elevation:</b>	0.00 usft	<b>Ground Level:</b>	1,251.00 usft

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	7/23/2016	-8.63	66.98	52,282

<b>Design</b>	rev2			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>
	0.00	0.00	0.00	158.01

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	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,350.00	3.00	220.00	1,349.93	-3.01	-2.52	2.00	2.00	0.00	220.00	
4,003.71	3.00	220.00	4,000.00	-109.40	-91.80	0.00	0.00	0.00	0.00	
4,304.62	20.50	253.08	4,293.62	-130.94	-147.73	6.00	5.81	10.99	38.07	
5,906.13	20.50	253.08	5,793.73	-294.17	-684.24	0.00	0.00	0.00	0.00	
6,842.25	89.00	149.98	6,376.00	-884.70	-583.44	10.00	7.32	-11.01	0.00	
13,093.71	89.00	149.98	6,485.00	-6,296.88	2,543.41	0.00	0.00	0.00	0.00	

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SI-01887



Planning Report - Geographic

<b>Database:</b>	DB Jul2216dt	<b>Local Co-ordinate Reference:</b>	Well Greer 1S-02M
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL @ 1251.00usft
<b>Project:</b>	Marshall County, West Virginia	<b>MD Reference:</b>	GL @ 1251.00usft
<b>Site:</b>	Greer Unit N	<b>North Reference:</b>	Grid
<b>Well:</b>	Greer 1S-02M	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev2		

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	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
100.00	0.00	0.00	100.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
200.00	0.00	0.00	200.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
300.00	0.00	0.00	300.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
400.00	0.00	0.00	400.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
500.00	0.00	0.00	500.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
600.00	0.00	0.00	600.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
700.00	0.00	0.00	700.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
800.00	0.00	0.00	800.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
900.00	0.00	0.00	900.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,438,288.21	1,686,407.56	39.75699174	-80.83635533	
<b>KOP Begin 2°/100' build</b>										
1,300.00	2.00	220.00	1,299.98	-1.34	-1.12	14,438,286.88	1,686,406.44	39.75698808	-80.83635933	
1,350.00	3.00	220.00	1,349.93	-3.01	-2.52	14,438,285.21	1,686,405.04	39.75698349	-80.83636433	
<b>Begin 3.00° tangent section</b>										
1,400.00	3.00	220.00	1,399.86	-5.01	-4.21	14,438,283.20	1,686,403.36	39.75697800	-80.83637033	
1,500.00	3.00	220.00	1,499.73	-9.02	-7.57	14,438,279.19	1,686,399.99	39.75696700	-80.83638232	
1,600.00	3.00	220.00	1,599.59	-13.03	-10.93	14,438,275.18	1,686,396.63	39.75695601	-80.83639432	
1,700.00	3.00	220.00	1,699.45	-17.04	-14.30	14,438,271.17	1,686,393.26	39.75694502	-80.83640632	
1,800.00	3.00	220.00	1,799.31	-21.05	-17.66	14,438,267.16	1,686,389.90	39.75693402	-80.83641831	
1,900.00	3.00	220.00	1,899.18	-25.06	-21.03	14,438,263.16	1,686,386.54	39.75692303	-80.83643031	
2,000.00	3.00	220.00	1,999.04	-29.07	-24.39	14,438,259.15	1,686,383.17	39.75691204	-80.83644231	
2,100.00	3.00	220.00	2,098.90	-33.08	-27.75	14,438,255.14	1,686,379.81	39.75690105	-80.83645430	
2,200.00	3.00	220.00	2,198.77	-37.09	-31.12	14,438,251.13	1,686,376.44	39.75689005	-80.83646630	
2,300.00	3.00	220.00	2,298.63	-41.09	-34.48	14,438,247.12	1,686,373.08	39.75687906	-80.83647829	
2,400.00	3.00	220.00	2,398.49	-45.10	-37.85	14,438,243.11	1,686,369.72	39.75686806	-80.83649029	
2,500.00	3.00	220.00	2,498.36	-49.11	-41.21	14,438,239.10	1,686,366.35	39.75685707	-80.83650229	
2,600.00	3.00	220.00	2,598.22	-53.12	-44.57	14,438,235.09	1,686,362.99	39.75684608	-80.83651428	
2,700.00	3.00	220.00	2,698.08	-57.13	-47.94	14,438,231.08	1,686,359.62	39.75683508	-80.83652628	
2,800.00	3.00	220.00	2,797.94	-61.14	-51.30	14,438,227.07	1,686,356.26	39.75682409	-80.83653827	
2,900.00	3.00	220.00	2,897.81	-65.15	-54.67	14,438,223.06	1,686,352.90	39.75681310	-80.83655027	
3,000.00	3.00	220.00	2,997.67	-69.16	-58.03	14,438,219.05	1,686,349.53	39.75680210	-80.83656227	
3,100.00	3.00	220.00	3,097.53	-73.17	-61.40	14,438,215.05	1,686,346.17	39.75679111	-80.83657426	
3,200.00	3.00	220.00	3,197.40	-77.18	-64.76	14,438,211.04	1,686,342.80	39.75678011	-80.83658626	
3,300.00	3.00	220.00	3,297.26	-81.19	-68.12	14,438,207.03	1,686,339.44	39.75676912	-80.83659825	
3,400.00	3.00	220.00	3,397.12	-85.20	-71.49	14,438,203.02	1,686,336.08	39.75675813	-80.83661025	
3,500.00	3.00	220.00	3,496.99	-89.20	-74.85	14,438,199.01	1,686,332.71	39.75674713	-80.83662225	
3,600.00	3.00	220.00	3,596.85	-93.21	-78.22	14,438,195.00	1,686,329.35	39.75673614	-80.83663424	
3,700.00	3.00	220.00	3,696.71	-97.22	-81.58	14,438,190.99	1,686,325.98	39.75672515	-80.83664624	
3,800.00	3.00	220.00	3,796.57	-101.23	-84.94	14,438,186.98	1,686,322.62	39.75671415	-80.83665823	
3,900.00	3.00	220.00	3,896.44	-105.24	-88.31	14,438,182.97	1,686,319.25	39.75670316	-80.83667023	
4,000.00	3.00	220.00	3,996.30	-109.25	-91.67	14,438,178.96	1,686,315.89	39.75669216	-80.83668223	
4,003.71	3.00	220.00	4,000.00	-109.40	-91.80	14,438,178.81	1,686,315.77	39.75669176	-80.83668267	
<b>Begin 6°/100' build/turn</b>										
4,100.00	8.35	245.32	4,095.80	-114.25	-99.77	14,438,173.96	1,686,307.79	39.75667847	-80.83671108	
4,200.00	14.26	250.73	4,193.82	-121.35	-118.01	14,438,166.86	1,686,289.55	39.75665906	-80.83674604	
4,300.00	20.22	253.00	4,289.29	-130.48	-146.19	14,438,157.74	1,686,261.37	39.75663445	-80.83687634	
4,304.62	20.50	253.08	4,293.62	-130.94	-147.73	14,438,157.27	1,686,259.84	39.75663287	-80.83688182	
<b>Begin 20.50° tangent section</b>										
4,400.00	20.50	253.08	4,382.96	-140.67	-179.68	14,438,147.55	1,686,227.88	39.75660649	-80.83699557	
4,500.00	20.50	253.08	4,476.63	-150.86	-213.18	14,438,137.36	1,686,194.38	39.75657111	-80.8371484	
4,600.00	20.50	253.08	4,570.30	-161.05	-246.68	14,438,127.16	1,686,160.88	39.75655069	-80.83723410	

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Planning Report - Geographic

<b>Database:</b>	DB Jul2216dt	<b>Local Co-ordinate Reference:</b>	Well Greer 1S-02M
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL @ 1251.00usft
<b>Project:</b>	Marshall County, West Virginia	<b>MD Reference:</b>	GL @ 1251.00usft
<b>Site:</b>	Greer Unit N	<b>North Reference:</b>	Grid
<b>Well:</b>	Greer 1S-02M	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev2		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
4,700.00	20.50	253.08	4,663.96	-171.24	-280.18	14,438,116.97	1,686,127.38	39.75652286	-80.83735337	
4,800.00	20.50	253.08	4,757.63	-181.43	-313.68	14,438,106.78	1,686,093.88	39.75649504	-80.83747264	
4,900.00	20.50	253.08	4,851.30	-191.62	-347.18	14,438,096.59	1,686,060.38	39.75646722	-80.83759190	
5,000.00	20.50	253.08	4,944.97	-201.82	-380.68	14,438,086.40	1,686,026.88	39.75643939	-80.83771117	
5,100.00	20.50	253.08	5,038.64	-212.01	-414.18	14,438,076.21	1,685,993.38	39.75641157	-80.83783043	
5,200.00	20.50	253.08	5,132.31	-222.20	-447.68	14,438,066.01	1,685,959.88	39.75638375	-80.83794970	
5,300.00	20.50	253.08	5,225.98	-232.39	-481.18	14,438,055.82	1,685,926.38	39.75635592	-80.83806897	
5,400.00	20.50	253.08	5,319.65	-242.58	-514.68	14,438,045.63	1,685,892.88	39.75632810	-80.83818823	
5,500.00	20.50	253.08	5,413.31	-252.78	-548.18	14,438,035.44	1,685,859.38	39.75630028	-80.83830750	
5,600.00	20.50	253.08	5,506.98	-262.97	-581.69	14,438,025.25	1,685,825.88	39.75627245	-80.83842676	
5,700.00	20.50	253.08	5,600.65	-273.16	-615.19	14,438,015.05	1,685,792.38	39.75624463	-80.83854603	
5,800.00	20.50	253.08	5,694.32	-283.35	-648.69	14,438,004.86	1,685,758.88	39.75621680	-80.83866529	
5,900.00	20.50	253.08	5,787.99	-293.54	-682.19	14,437,994.67	1,685,725.38	39.75618898	-80.83878456	
5,906.13	20.50	253.08	5,793.73	-294.17	-684.24	14,437,994.04	1,685,723.32	39.75618727	-80.83879187	
<b>Begin 10°/100' build/turm</b>										
6,000.00	20.51	226.06	5,881.85	-310.40	-711.86	14,437,977.82	1,685,695.70	39.75614284	-80.83889026	
6,100.00	24.63	202.08	5,974.37	-341.94	-732.36	14,437,946.27	1,685,675.20	39.75605631	-80.83896339	
6,200.00	31.38	186.21	6,062.73	-387.25	-743.04	14,437,900.96	1,685,664.52	39.75593193	-80.83900168	
6,300.00	39.42	175.87	6,144.25	-444.94	-743.57	14,437,843.27	1,685,663.99	39.75577349	-80.83900395	
6,400.00	48.10	168.66	6,216.46	-513.27	-733.95	14,437,774.94	1,685,673.61	39.75558580	-80.83897014	
6,500.00	57.12	163.21	6,277.15	-590.15	-714.46	14,437,698.06	1,685,693.11	39.75537456	-80.83890127	
6,600.00	66.33	158.79	6,324.49	-673.26	-685.69	14,437,614.96	1,685,721.87	39.75514619	-80.83879945	
6,700.00	75.65	154.96	6,357.04	-760.05	-648.52	14,437,528.16	1,685,759.04	39.75490764	-80.83866776	
6,800.00	85.03	151.43	6,373.80	-847.91	-604.08	14,437,440.30	1,685,803.48	39.75466614	-80.83851020	
6,842.25	89.00	149.98	6,376.00	-884.70	-583.44	14,437,403.51	1,685,824.12	39.75456500	-80.83843700	
<b>Begin 89.00° lateral section</b>										
6,900.00	89.00	149.98	6,377.01	-934.70	-554.56	14,437,353.52	1,685,853.01	39.75442755	-80.83833455	
7,000.00	89.00	149.98	6,378.75	-1,021.27	-504.54	14,437,266.94	1,685,903.02	39.75418954	-80.83815714	
7,100.00	89.00	149.98	6,380.49	-1,107.85	-454.52	14,437,180.37	1,685,953.04	39.75395154	-80.83797973	
7,200.00	89.00	149.98	6,382.24	-1,194.42	-404.50	14,437,093.79	1,686,003.06	39.75371353	-80.83780232	
7,300.00	89.00	149.98	6,383.98	-1,280.99	-354.48	14,437,007.22	1,686,053.08	39.75347552	-80.83762491	
7,400.00	89.00	149.98	6,385.73	-1,367.57	-304.47	14,436,920.64	1,686,103.10	39.75323751	-80.83744751	
7,500.00	89.00	149.98	6,387.47	-1,454.14	-254.45	14,436,834.07	1,686,153.11	39.75299950	-80.83727011	
7,600.00	89.00	149.98	6,389.21	-1,540.72	-204.43	14,436,747.49	1,686,203.13	39.75276149	-80.83709270	
7,700.00	89.00	149.98	6,390.96	-1,627.29	-154.41	14,436,660.92	1,686,253.15	39.75252348	-80.83691530	
7,800.00	89.00	149.98	6,392.70	-1,713.87	-104.40	14,436,574.35	1,686,303.17	39.75228547	-80.83673790	
7,900.00	89.00	149.98	6,394.44	-1,800.44	-54.38	14,436,487.77	1,686,353.19	39.75204746	-80.83656050	
8,000.00	89.00	149.98	6,396.19	-1,887.02	-4.36	14,436,401.20	1,686,403.20	39.75180945	-80.83638310	
8,100.00	89.00	149.98	6,397.93	-1,973.59	45.66	14,436,314.62	1,686,453.22	39.75157144	-80.83620571	
8,200.00	89.00	149.98	6,399.67	-2,060.17	95.68	14,436,228.05	1,686,503.24	39.75133343	-80.83602831	
8,300.00	89.00	149.98	6,401.42	-2,146.74	145.69	14,436,141.47	1,686,553.26	39.75109542	-80.83585092	
8,400.00	89.00	149.98	6,403.16	-2,233.32	195.71	14,436,054.90	1,686,603.27	39.75085741	-80.83567353	
8,500.00	89.00	149.98	6,404.90	-2,319.89	245.73	14,435,968.32	1,686,653.29	39.75061939	-80.83549613	
8,600.00	89.00	149.98	6,406.65	-2,406.47	295.75	14,435,881.75	1,686,703.31	39.75038138	-80.83531874	
8,700.00	89.00	149.98	6,408.39	-2,493.04	345.77	14,435,795.17	1,686,753.33	39.75014336	-80.83514135	
8,800.00	89.00	149.98	6,410.14	-2,579.61	395.78	14,435,708.60	1,686,803.35	39.74990534	-80.83496397	
8,900.00	89.00	149.98	6,411.88	-2,666.19	445.80	14,435,622.02	1,686,853.36	39.74966731	-80.83478658	
9,000.00	89.00	149.98	6,413.62	-2,752.76	495.82	14,435,535.45	1,686,903.38	39.74942933	-80.83460919	
9,100.00	89.00	149.98	6,415.37	-2,839.34	545.84	14,435,448.88	1,686,953.40	39.74919132	-80.83443181	
9,200.00	89.00	149.98	6,417.11	-2,925.91	595.86	14,435,362.30	1,687,003.42	39.74895330	-80.83425443	
9,300.00	89.00	149.98	6,418.85	-3,012.49	645.87	14,435,275.73	1,687,053.44	39.74871529	-80.83407704	
9,400.00	89.00	149.98	6,420.60	-3,099.06	695.89	14,435,189.15	1,687,103.45	39.74847727	-80.83389966	
9,500.00	89.00	149.98	6,422.34	-3,185.64	745.91	14,435,102.58	1,687,153.47	39.74823926	-80.83372228	
9,600.00	89.00	149.98	6,424.08	-3,272.21	795.93	14,435,016.00	1,687,203.49	39.74800124	-80.83354491	





51-01887



Planning Report - Geographic

<b>Database:</b>	DB Jul2216dt	<b>Local Co-ordinate Reference:</b>	Well Greer 1S-02M
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL @ 1251.00usft
<b>Project:</b>	Marshall County, West Virginia	<b>MD Reference:</b>	GL @ 1251.00usft
<b>Site:</b>	Greer Unit N	<b>North Reference:</b>	Grid
<b>Well:</b>	Greer 1S-02M	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev2		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
9,700.00	89.00	149.98	6,425.83	-3,358.79	845.95	14,434,929.43	1,687,253.51	39.74776323	-80.83336753	
9,800.00	89.00	149.98	6,427.57	-3,445.36	895.96	14,434,842.85	1,687,303.53	39.74752521	-80.83319015	
9,900.00	89.00	149.98	6,429.31	-3,531.94	945.98	14,434,756.28	1,687,353.54	39.74728720	-80.83301278	
10,000.00	89.00	149.98	6,431.06	-3,618.51	996.00	14,434,669.70	1,687,403.56	39.74704918	-80.83283541	
10,100.00	89.00	149.98	6,432.80	-3,705.08	1,046.02	14,434,583.13	1,687,453.58	39.74681116	-80.83265803	
10,200.00	89.00	149.98	6,434.55	-3,791.66	1,096.03	14,434,496.55	1,687,503.60	39.74657315	-80.83248066	
10,300.00	89.00	149.98	6,436.29	-3,878.23	1,146.05	14,434,409.98	1,687,553.62	39.74633513	-80.83230329	
10,400.00	89.00	149.98	6,438.03	-3,964.81	1,196.07	14,434,323.41	1,687,603.63	39.74609711	-80.83212592	
10,500.00	89.00	149.98	6,439.78	-4,051.38	1,246.09	14,434,236.83	1,687,653.65	39.74585909	-80.83194856	
10,600.00	89.00	149.98	6,441.52	-4,137.96	1,296.11	14,434,150.26	1,687,703.67	39.74562108	-80.83177119	
10,700.00	89.00	149.98	6,443.26	-4,224.53	1,346.12	14,434,063.68	1,687,753.69	39.74538306	-80.83159383	
10,800.00	89.00	149.98	6,445.01	-4,311.11	1,396.14	14,433,977.11	1,687,803.71	39.74514504	-80.83141646	
10,900.00	89.00	149.98	6,446.75	-4,397.68	1,446.16	14,433,890.53	1,687,853.72	39.74490702	-80.83123910	
11,000.00	89.00	149.98	6,448.49	-4,484.26	1,496.18	14,433,803.96	1,687,903.74	39.74466900	-80.83106174	
11,100.00	89.00	149.98	6,450.24	-4,570.83	1,546.20	14,433,717.38	1,687,953.76	39.74443098	-80.83088438	
11,200.00	89.00	149.98	6,451.98	-4,657.41	1,596.21	14,433,630.81	1,688,003.78	39.74419296	-80.83070702	
11,300.00	89.00	149.98	6,453.73	-4,743.98	1,646.23	14,433,544.23	1,688,053.79	39.74395494	-80.83052966	
11,400.00	89.00	149.98	6,455.47	-4,830.55	1,696.25	14,433,457.66	1,688,103.81	39.74371692	-80.83035231	
11,500.00	89.00	149.98	6,457.21	-4,917.13	1,746.27	14,433,371.08	1,688,153.83	39.74347890	-80.83017495	
11,600.00	89.00	149.98	6,458.96	-5,003.70	1,796.29	14,433,284.51	1,688,203.85	39.74324088	-80.82999760	
11,700.00	89.00	149.98	6,460.70	-5,090.28	1,846.30	14,433,197.93	1,688,253.87	39.74300286	-80.82982025	
11,800.00	89.00	149.98	6,462.44	-5,176.85	1,896.32	14,433,111.36	1,688,303.88	39.74276484	-80.82964289	
11,900.00	89.00	149.98	6,464.19	-5,263.43	1,946.34	14,433,024.79	1,688,353.90	39.74252682	-80.82946554	
12,000.00	89.00	149.98	6,465.93	-5,350.00	1,996.36	14,432,938.21	1,688,403.92	39.74228880	-80.82928819	
12,100.00	89.00	149.98	6,467.67	-5,436.58	2,046.38	14,432,851.64	1,688,453.94	39.74205077	-80.82911085	
12,200.00	89.00	149.98	6,469.42	-5,523.15	2,096.39	14,432,765.06	1,688,503.96	39.74181275	-80.82893350	
12,300.00	89.00	149.98	6,471.16	-5,609.73	2,146.41	14,432,678.49	1,688,553.97	39.74157473	-80.82875616	
12,400.00	89.00	149.98	6,472.90	-5,696.30	2,196.43	14,432,591.91	1,688,603.99	39.74133671	-80.82857881	
12,500.00	89.00	149.98	6,474.65	-5,782.88	2,246.45	14,432,505.34	1,688,654.01	39.74109868	-80.82840147	
12,600.00	89.00	149.98	6,476.39	-5,869.45	2,296.47	14,432,418.76	1,688,704.03	39.74086066	-80.82822413	
12,700.00	89.00	149.98	6,478.14	-5,956.03	2,346.48	14,432,332.19	1,688,754.05	39.74062264	-80.82804679	
12,800.00	89.00	149.98	6,479.88	-6,042.60	2,396.50	14,432,245.61	1,688,804.06	39.74038461	-80.82786945	
12,900.00	89.00	149.98	6,481.62	-6,129.17	2,446.52	14,432,159.04	1,688,854.08	39.74014659	-80.82769211	
13,000.00	89.00	149.98	6,483.37	-6,215.75	2,496.54	14,432,072.46	1,688,904.10	39.73990856	-80.82751477	
13,093.71	89.00	149.98	6,485.00	-6,296.88	2,543.41	14,431,991.34	1,688,950.97	39.73968551	-80.82734859	
PBHLLTD										

Design Targets										
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
Greer 1S-2M LP r1 - plan hits target center - Point	0.00	0.00	6,376.00	-884.70	-583.44	14,437,403.51	1,685,824.12	39.75456550	-80.83843700	
Greer 1S-2M PBHLL r1 - plan hits target center - Point	0.00	0.00	6,485.00	-6,296.88	2,543.41	14,431,991.34	1,688,950.97	39.73968551	-80.82734859	

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Planning Report - Geographic

<b>Database:</b>	DB Jul2216dt	<b>Local Co-ordinate Reference:</b>	Well Greer 1S-02M
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL @ 1251.00usft
<b>Project:</b>	Marshall County, West Virginia	<b>MD Reference:</b>	GL @ 1251.00usft
<b>Site:</b>	Greer Unit N	<b>North Reference:</b>	Grid
<b>Well:</b>	Greer 1S-02M	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev2		

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,000.00	1,000.00	13 3/8" Casing @ 1000 TVD	13-3/8	17-1/2
2,601.78	2,600.00	9 5/8" Casing @ 2600 TVD	9-5/8	12-1/4

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,200.00	1,200.00	0.00	0.00	KOP Begin 2°/100' build
1,350.00	1,349.93	-3.01	-2.52	Begin 3.00° tangent section
4,003.71	4,000.00	-109.40	-91.80	Begin 6°/100' build/turn
4,304.62	4,293.62	-130.94	-147.73	Begin 20.50° tangent section
5,906.13	5,793.73	-294.17	-684.24	Begin 10°/100' build/turn
6,842.25	6,376.00	-884.70	-583.44	Begin 89.00° lateral section
13,093.71	6,485.00	-6,296.88	2,543.41	PBHL/TD

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WW-9  
(4/16)

API Number 47 - 051 - 01887  
Operator's Well No. Greer 1S-2HM

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) Fish Creek - Ohio River (Undefined) Quadrangle Powhatan Point 7.5'

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

Will a pit be used? Yes  No

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

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

Proposed Disposal Method For Treated Pit Wastes:

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

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

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

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

Additives to be used in drilling medium? Barite for weight

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. All drill cuttings to be disposed of in Wetzel County Sanitary 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 / WV0109185)

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 

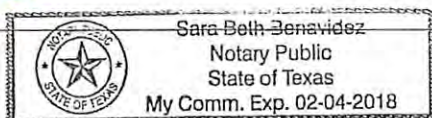
Company Official (Typed Name) David Patterson

Company Official Title Senior Vice President, Operations

Subscribed and sworn before me this 24th day of October, 20 16

Sara Beth Benavidez Notary Public

My commission expires 2-4-18



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SI-01887

Form WW-9

Operator's Well No. Greer 1S-2HM

Tug Hill Operating, LLC

Proposed Revegetation Treatment: Acres Disturbed 17.78 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
Rye Grain	140

Seed Type	lbs/acre
Tall Fescue	40
Ladino Clover	5

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: Jim Anderson

Comments:

Title: Oil + Gas Inspector

Date: 10/25/16

Field Reviewed? (X) Yes ( ) No

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WW-9

# PROPOSED GREER 1 S-2HM

SUPPLEMENT PG 1-A

DRAWING NOT  
TO SCALE

TM 20 - PAR. 27  
PPG INDUSTRIES, INC.  
119.83 ACRES

TM 21 - PAR. 24  
PPG INDUSTRIES, INC.  
132.5 ACRES

TM 21 - PAR. 24  
PPG INDUSTRIES, INC.  
132.5 ACRES

TM 21 - PAR. 24  
PPG INDUSTRIES, INC.  
132.5 ACRES

TM 21 - PAR. 24  
PPG INDUSTRIES, INC.  
132.5 ACRES

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.

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.

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.

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Note:  
© - Denotes installation of 36" RVC culvert and apply appropriate sediment outlet control (Rip Rap splash pad).

----- Silt Fence and/or Sediment and Erosion Control Measure.

DATE: 10/12/16

PROJECT NO: W0120319

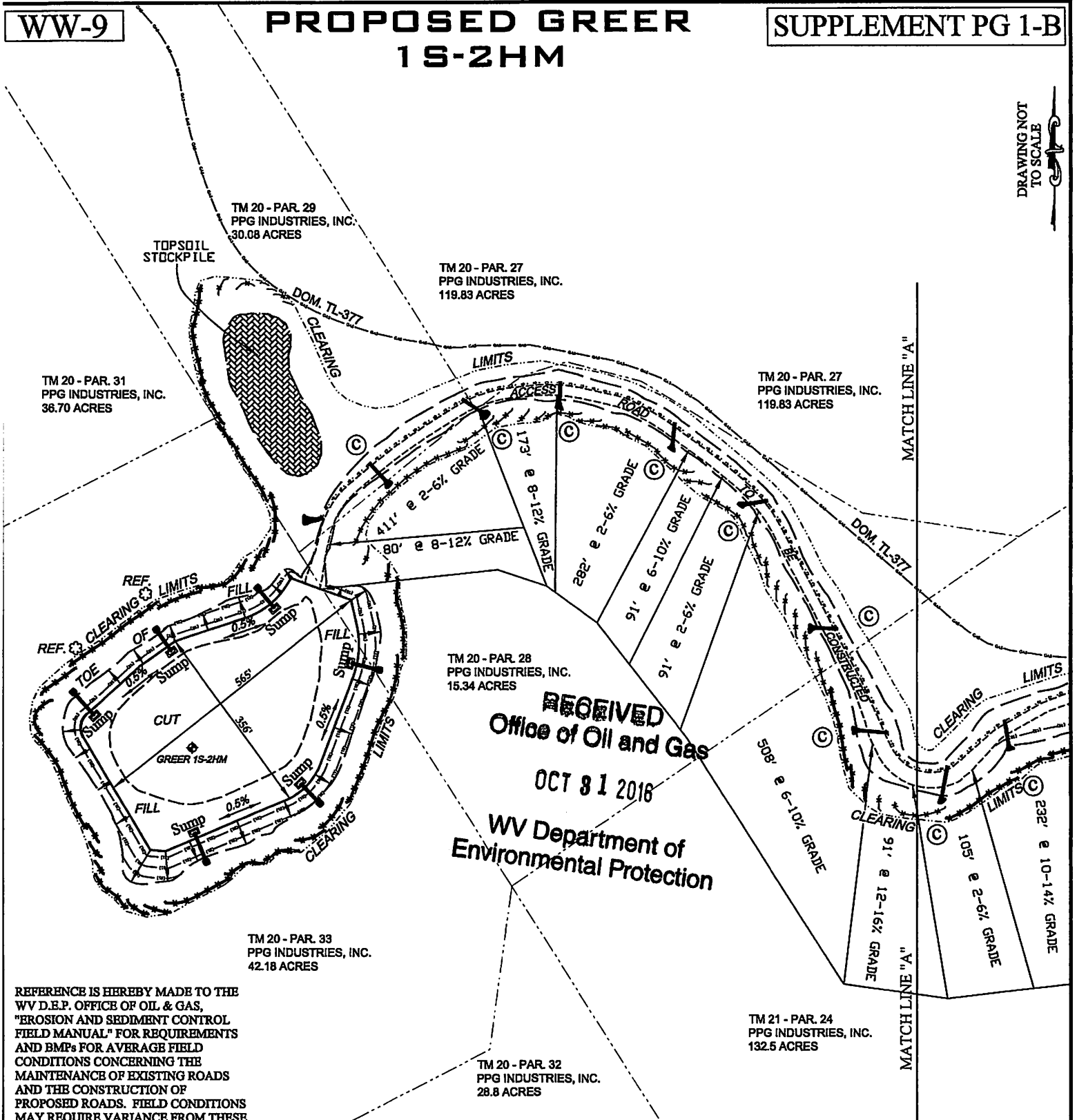
DRAWN BY: J.N.W.

01/27/2017



# PROPOSED GREER 1S-2HM

DRAWING NOT TO SCALE



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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 BARTHWORK 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.

Note:  
Ⓢ — Denotes install 18" PVC culvert and apply appropriate sediment outlet control (Rip Rap splash pad).

----- Silt Fence and or Sediment and Erosion Control Measure.

DATE: 10/12/16

PROJECT NO: W0120319

DRAWN BY: J.N.W.

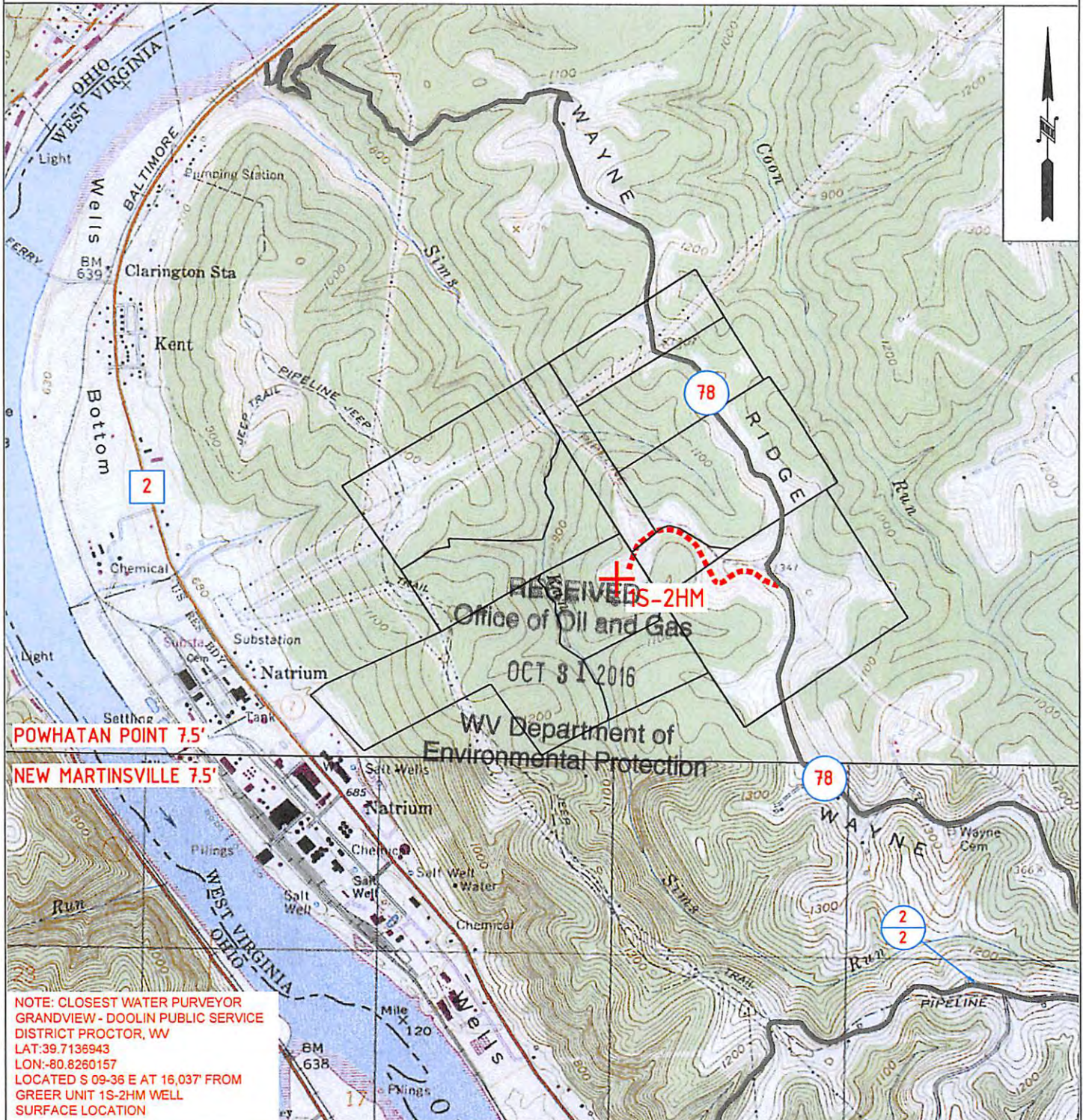
01/27/2017



WW-9

# PROPOSED GREER 1S-2HM

SUPPLEMENT PG 2



NOTE: CLOSEST WATER PURVEYOR  
GRANDVIEW - DOOLIN PUBLIC SERVICE  
DISTRICT PROCTOR, WV  
LAT: 39.7136943  
LON: -80.8260157  
LOCATED S 09-36 E AT 16,037' FROM  
GREER UNIT 1S-2HM WELL  
SURFACE LOCATION



OPERATOR	163-697(CEC)	TOPO SECTION	LEASE NAME
TUG HILL OPERATING, LLC 380 SOUTHPOINTE BLVD SUITE 200 CANONSBURG, PA 15317		POWHATAN POINT 7.5'	GREER
		SCALE:	DATE:
		1" = 2000'	DATE: 10/12/16

01/27/2017



51-01887



# Well Site Safety Plan

## Tug Hill Operating, LLC

*JW 10/25/16*

Well Name: Greer 1S-2HM

Pad Location: Greer Pad

Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:

NORTHING -4,400,799.0

EASTING -514,018.1

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form wv6

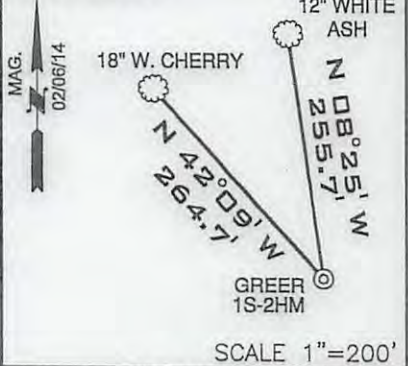
←910'

PG 1 OF 2 NOTES

1. BORE PATH BASED ON GRID NORTH.
2. NO WATER WELLS WITHIN 250' OF WELL WERE FOUND, NO DWELLINGS WITHIN 625' OF PAD CENTER WERE FOUND.
3. OWNERSHIP TAKEN FROM PUBLIC RECORDS OF MARSHALL COUNTY, WV IN JULY, 2016. COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS.
4. WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.

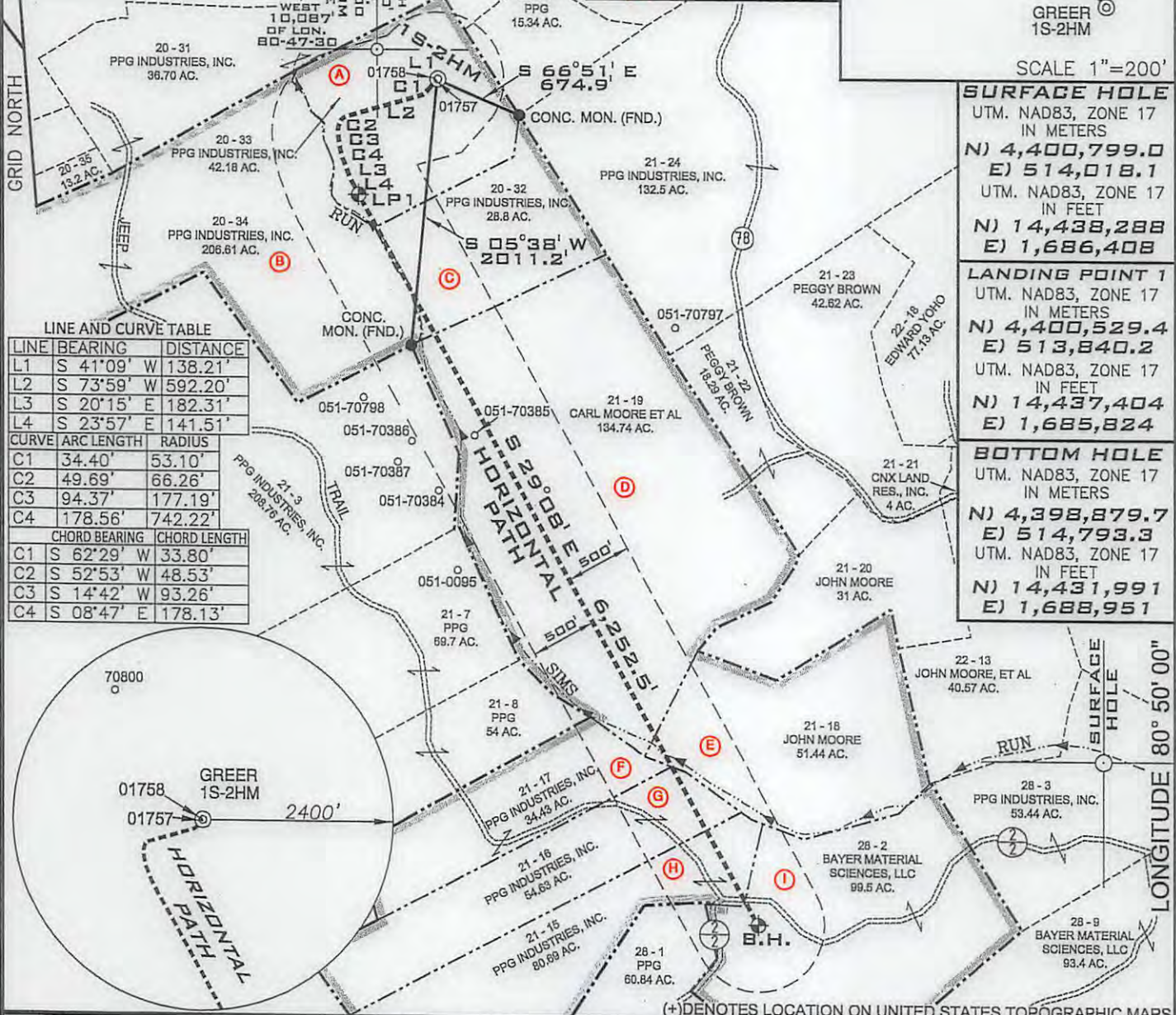
LATITUDE 39° 47' 30" **GREER LEASE**  
**WELL NO. 1S-2HM**  
**733.02± ACRES**

REFERENCES



**LEGEND**

- LEASED TRACTS
- INTERIOR MINERAL TRACTS
- SURFACE TRACTS
- HARD LEASE LINE
- (A) LEASE # (SEE PG 2)



**LINE AND CURVE TABLE**

LINE	BEARING	DISTANCE
L1	S 41°09' W	138.21'
L2	S 73°59' W	592.20'
L3	S 20°15' E	182.31'
L4	S 23°57' E	141.51'

CURVE	ARC LENGTH	RADIUS
C1	34.40'	53.10'
C2	49.69'	66.26'
C3	94.37'	177.19'
C4	178.56'	742.22'

CHORD BEARING	CHORD LENGTH
C1	S 62°29' W 33.80'
C2	S 52°53' W 48.53'
C3	S 14°42' W 93.26'
C4	S 08°47' E 178.13'

**SURFACE HOLE**  
 UTM. NAD83, ZONE 17  
 IN METERS  
**N) 4,400,799.0**  
**E) 514,018.1**

UTM. NAD83, ZONE 17  
 IN FEET  
**N) 14,438,288**  
**E) 1,686,408**

**LANDING POINT 1**  
 UTM. NAD83, ZONE 17  
 IN METERS  
**N) 4,400,529.4**  
**E) 513,840.2**

UTM. NAD83, ZONE 17  
 IN FEET  
**N) 14,437,404**  
**E) 1,685,824**

**BOTTOM HOLE**  
 UTM. NAD83, ZONE 17  
 IN METERS  
**N) 4,398,879.7**  
**E) 514,798.3**

UTM. NAD83, ZONE 17  
 IN FEET  
**N) 14,431,991**  
**E) 1,688,951**



FILE NUMBER W0120319 (WB1-76)

DRAWING NUMBER GREER\_WP\_1S-2HM

SCALE 1" = 1200'

MINIMUM DEGREE OF ACCURACY 1/2500

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. 2122 *Jonathan N. White*



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

DATE: OCTOBER 21, 2016

OPERATORS WELL NO. GREER 1S-2HM

API WELL NO. 47-051-01887 H6A

STATE WV COUNTY MARSHALL PERMIT 01887 H6A

LOCATION ELEVATION 1251' WATERSHED (HUC 10) FRENCH CREEK - OHIO RIVER (UNDEFINED)

DISTRICT FRANKLIN COUNTY MARSHALL

QUADRANGLE POWHATAN POINT 7.5' LEASE NUMBER SEE ATTACHED PG 2 OF 2

SURFACE OWNER PPG INDUSTRIES, INC. ACREAGE 42.18

OIL & GAS ROYALTY OWNER PPG INDUSTRIES, INC., ET AL LEASE ACREAGE 733.02

PROPOSED WORK: DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION

PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE (SPECIFY) \_\_\_\_\_

TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD 6,506' TMD:13,094'

WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DIANNA STAMPER

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

01/27/2017

COUNTY NAME PERMIT



**GREER WELL NO. 18-2HM  
WELL PLAT LEASE INFORMATION**

Lease No.	Tag	Parcel	Oil & Gas Royalty Owner	DEED BOOK/PG	
10*14300	A	5-20-33	PPG INDUSTRIES, INC.	725	123
10*14312	A	5-20-33	JAMIE LU BENSON	790	531
10*14313	A	5-20-33	TERRI JEAN GODDARD	790	585
10*14314	A	5-20-33	RALPH BLACHLY	790	529
10*14315	A	5-20-33	MARGARET ROSS	790	527
10*14316	A	5-20-33	ANDREW GERST	791	645
10*14317	A	5-20-33	HAROLD BLACHLY	791	643
10*14318	A	5-20-33	MARTHA BLACHLY-CROSS	792	112
10*14319	A	5-20-33	JACK J. PFALZGRAF	792	118
10*14320	A	5-20-33	SANDRA CHEYNEY	792	91
10*14321	A	5-20-33	HERBERT BLACHLY	792	102
10*14322	A	5-20-33	LOIS KAY MORFORD	792	110
10*14327	A	5-20-33	ROBERT D. OKEY	792	646
10*14328	A	5-20-33	RAE ELLEN STUART	796	38
10*14329	A	5-20-33	TONDA ROTHENBUHLER	796	40
10*14331	A	5-20-33	CHRISTINA JEAN RIOUX	796	70
10*14332	A	5-20-33	MICHAEL EDWARD BARTH	796	68
10*14333	A	5-20-33	DEAN ROTHENBUHLER	796	42
10*14355	A	5-20-33	DEWAYNE STARKEY	815	228
10*14356	A	5-20-33	FREDRIC RICHTER & BETTY RICHTER	822	270
10*14362	A	5-20-33	CAROLYN STARKEY	827	226
10*14368	A	5-20-33	JOSEPH LONG	836	106
10*14371	A	5-20-33	THOMAS F LONG AND JENNIFER LONG	842	398
10*14372	A	5-20-33	UNITED CHURCH HOMES INC	846	408
10*14377	A	5-20-33	JOSEPH A LONG	849	519
10*14387	A	5-20-33	JOHN F LONG AND PAM LONG	849	542
10*14388	A	5-20-33	IMMANUEL CHURCH OF THE UNITED CHURCH OF CHRIST	849	513
10*14398	A	5-20-33	JAN KAFFENBERGER	860	434
10*14399	A	5-20-33	RITA ANN DOEBERT AND RONALD DOEBERT	860	437
10*14400	A	5-20-33	COLEEN SLAGLE AND FRANKLIN SLAGLE	860	440
10*14401	A	5-20-33	IMELDA J SCURLOCK	860	443
10*14402	A	5-20-33	CAROL F WILSON AND RICHARD WILSON	860	446
10*14403	A	5-20-33	SUE WHITE	862	429
10*14404	A	5-20-33	DON FORGRAVES	862	426
10*14405	A	5-20-33	JOHN WHITE	862	423
10*14395	A	5-20-33	WILLIAM V BUCKNOR	862	421
10*14394	A	5-20-33	LESLIE F BUCKNOR	862	419
10*14408	A	5-20-33	LORNA M LONG MORGAN	864	323
10*14409	A	5-20-33	JAMES C LONG AND PATTI LONG	864	326
10*14410	A	5-20-33	HENRY T LONG	867	385
10*14411	A	5-20-33	THOMAS WHITE, ESQ., SPECIAL COMMISSIONER	870	34
10*14412	A	5-20-33	THE VILLAGE NETWORK	872	203
10*14413	A	5-20-33	JUANITA SANDIFER	872	206
10*14416	A	5-20-33	KATHERINE ANN WILLIAMS COTHRAN	879	1
10*14419	A	5-20-33	CROSSROAD CHILD AND FAMILY SERVICES	887	105
10*15734	A	5-20-33	GENEVIEVE L LONG	904	13
10*16358	A	5-20-33	ANNE MARIE KRAMER	903	648
10*15763	A	5-20-33	BONNIE J. SELTERS	904	34
10*15761	A	5-20-33	CAMERON CEMETERY ASSOCIATION	903	642
10*16356	A	5-20-33	DARYL S. BUCKNOR	904	31
10*15762	A	5-20-33	DAWN PETROVICH	904	4
10*16357	A	5-20-33	DEANNA M. CAMPBELL	904	1
10*15760	A	5-20-33	DIEDRE WINGER	903	645
10*15764	A	5-20-33	JAMES E BUCKNOR	904	28
10*16355	A	5-20-33	JAMES P LONG AND LINDA LONG	904	10
10*15765	A	5-20-33	JOHN A BUCKNOR	904	16
10*15766	A	5-20-33	JOHN J. POZENEL	904	7
10*16230	A	5-20-33	TH Exploration, LLC	900	134
10*14381	A	5-20-33	WILLIAM LONG	792	95
10*14300	B	5-20-34	PPG INDUSTRIES, INC.	725	123
10*14300	B	5-20-34	PPG INDUSTRIES, INC.	725	123
10*14300	C	5-20-32	PPG INDUSTRIES, INC.	725	123
10*14933	D	5-21-19	CLARA LOU HERRICK AND EDWIN A HERRICK	850	531
10*14934	D	5-21-19	GLENDA ROSE MOORE	849	564
10*14935	D	5-21-19	JOHN M MOORE AND MELANIE A MOORE	849	562
10*14936	D	5-21-19	LINDA LORRAINE MOORE	850	533
10*14937	E	5-21-18	JOHN M MOORE AND MELANIE A MOORE	850	524
10*14300	F	5-21-17	PPG INDUSTRIES, INC.	725	123
10*14300	G	5-21-16	PPG INDUSTRIES, INC.	725	123
10*14300	H	5-21-15	PPG INDUSTRIES, INC.	725	123
10*14498	I	5-28-2	BAYER MATERIALSCIENCE LLC	757	340

01/27/2017

WELL OPERATOR TUG HILL OPERATING, LLC  
ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500  
FORT WORTH, TX 76107

DESIGNATED AGENT DIANNA STAMPER  
CT CORPORATION SYSTEM  
ADDRESS 5400 D BIG TYLER ROAD  
CHARLESTON, WV 25313



51-01887

910'

form wv6

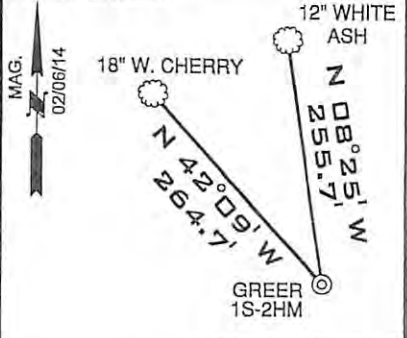
PG 1 OF 2

- NOTES
1. BORE PATH BASED ON GRID NORTH.
  2. NO WATER WELLS WITHIN 250' OF WELL WERE FOUND, NO DWELLINGS WITHIN 625' OF PAD CENTER WERE FOUND.
  3. OWNERSHIP TAKEN FROM PUBLIC RECORDS OF MARSHALL COUNTY, WV IN JULY, 2016. COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS.
  4. WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.

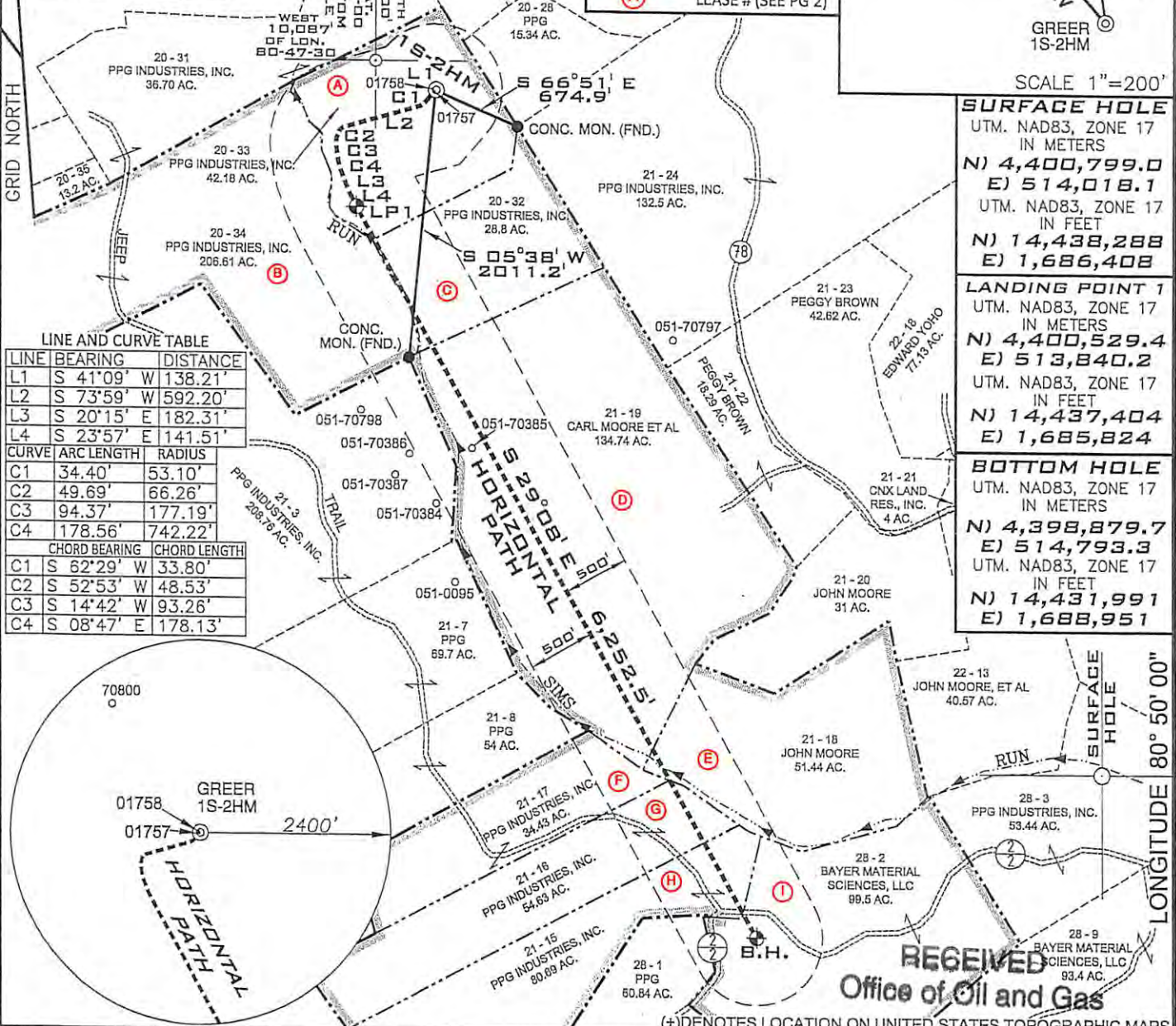
LATITUDE 39° 47' 30" **GREER LEASE**  
**WELL NO. 1S-2HM**  
**733.02± ACRES**

REFERENCES

- LEGEND
- LEASED TRACTS
  - INTERIOR MINERAL TRACTS
  - SURFACE TRACTS
  - HARD LEASE LINE
  - LEASE # (SEE PG 2)



SCALE 1"=200'



LINE AND CURVE TABLE

LINE	BEARING	DISTANCE
L1	S 41°09' W	138.21'
L2	S 73°59' W	592.20'
L3	S 20°15' E	182.31'
L4	S 23°57' E	141.51'

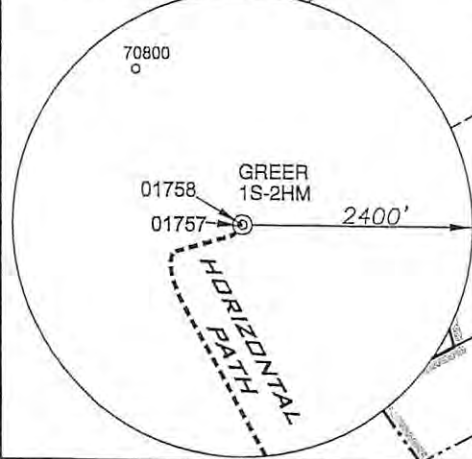
  

CURVE	ARC LENGTH	RADIUS
C1	34.40'	53.10'
C2	49.69'	66.26'
C3	94.37'	177.19'
C4	178.56'	742.22'

CHORD BEARING	CHORD LENGTH
C1	S 62°29' W 33.80'
C2	S 52°53' W 48.53'
C3	S 14°42' W 93.26'
C4	S 08°47' E 178.13'

- SURFACE HOLE**  
 UTM. NAD83, ZONE 17  
 IN METERS  
**N) 4,400,799.0**  
**E) 514,018.1**
- UTM. NAD83, ZONE 17  
 IN FEET  
**N) 14,438,288**  
**E) 1,686,408**
- LANDING POINT 1**  
 UTM. NAD83, ZONE 17  
 IN METERS  
**N) 4,400,529.4**  
**E) 513,840.2**
- UTM. NAD83, ZONE 17  
 IN FEET  
**N) 14,437,404**  
**E) 1,685,824**
- BOTTOM HOLE**  
 UTM. NAD83, ZONE 17  
 IN METERS  
**N) 4,398,879.7**  
**E) 514,793.3**
- UTM. NAD83, ZONE 17  
 IN FEET  
**N) 14,431,991**  
**E) 1,688,951**



FILE NUMBER W0120319 (WB1-76)

DRAWING NUMBER GREER\_WP\_1S-2HM

SCALE 1" = 1200'

MINIMUM DEGREE OF ACCURACY 1/2500

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. 2122  
*Matthew N. White*



RECEIVED  
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WV Department of Environmental Protection

Matthew N. White  
 STATE OF WEST VIRGINIA  
 PROFESSIONAL SURVEYOR

SEAL

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

DATE: OCTOBER 21, 2016

OPERATORS WELL NO. GREER 1S-2HM

API WELL NO. 47-051-01887 HGA

STATE WV COUNTY MARSHALL PERMIT 0127/2017

LOCATION ELEVATION 1251' WATERSHED (HUC 10) FRENCH CREEK - OHIO RIVER (UNDEFINED)

DISTRICT FRANKLIN COUNTY MARSHALL

QUADRANGLE POWHATAN POINT 7.5' LEASE NUMBER SEE ATTACHED PG 2 OF 2

SURFACE OWNER PPG INDUSTRIES, INC. ACREAGE 42.18

OIL & GAS ROYALTY OWNER PPG INDUSTRIES, INC., ET AL LEASE ACREAGE 733.02

PROPOSED WORK: DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION

PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE (SPECIFY) \_\_\_\_\_

PLUG & ABANDON  CLEAN OUT & REPLUG

TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD 6,506' TMD:13,094'

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

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



**GREER WELL NO. 1S-2HM  
WELL PLAT LEASE INFORMATION**

Lease No.	Tag	Parcel	Oil & Gas Royalty Owner	DEED BOOK/PAGE	
10*14300	A	5-20-33	PPG INDUSTRIES, INC.	725	123
10*14312	A	5-20-33	JAMIE LU BENSON	790	531
10*14313	A	5-20-33	TERRI JEAN GODDARD	790	585
10*14314	A	5-20-33	RALPH BLACHLY	790	529
10*14315	A	5-20-33	MARGARET ROSS	790	527
10*14316	A	5-20-33	ANDREW GERST	791	645
10*14317	A	5-20-33	HAROLD BLACHLY	791	643
10*14318	A	5-20-33	MARTHA BLACHLY-CROSS	792	112
10*14319	A	5-20-33	JACK J. PFALZGRAF	792	118
10*14320	A	5-20-33	SANDRA CHEYNEY	792	91
10*14321	A	5-20-33	HERBERT BLACHLY	792	102
10*14322	A	5-20-33	LOIS KAY MORFORD	792	110
10*14327	A	5-20-33	ROBERT D. OKEY	792	646
10*14328	A	5-20-33	RAE ELLEN STUART	796	38
10*14329	A	5-20-33	TONDA ROTHENBUHLER	796	40
10*14331	A	5-20-33	CHRISTINA JEAN RIOUX	796	70
10*14332	A	5-20-33	MICHAEL EDWARD BARTH	796	68
10*14333	A	5-20-33	DEAN ROTHENBUHLER	796	42
10*14355	A	5-20-33	DEWAYNE STARKEY	815	228
10*14356	A	5-20-33	FREDRIC RICHTER & BETTY RICHTER	822	270
10*14362	A	5-20-33	CAROLYN STARKEY	827	226
10*14368	A	5-20-33	JOSEPH LONG	836	106
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10*15761	A	5-20-33	CAMERON CEMETERY ASSOCIATION	903	642
10*16356	A	5-20-33	DARYL S. BUCKNOR	904	31
10*15762	A	5-20-33	DAWN PETROVICH	904	4
10*16357	A	5-20-33	DEANNA M. CAMPBELL	904	1
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10*15764	A	5-20-33	JAMES E BUCKNOR	904	28
10*16355	A	5-20-33	JAMES P LONG AND LINDA LONG	904	10
10*15765	A	5-20-33	JOHN A BUCKNOR	904	16
10*15766	A	5-20-33	JOHN J. POZENEL	904	7
10*16230	A	5-20-33	TH Exploration, LLC	900	134
10*14381	A	5-20-33	WILLIAM LONG	792	95
10*14300	B	5-20-34	PPG INDUSTRIES, INC.	725	123
10*14300	B	5-20-34	PPG INDUSTRIES, INC.	725	123
10*14300	C	5-20-32	PPG INDUSTRIES, INC.	725	123
10*14933	D	5-21-19	CLARA LOU HERRICK AND EDWIN A HERRICK	850	531
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10*14935	D	5-21-19	JOHN M MOORE AND MELANIE A MOORE	849	562
10*14936	D	5-21-19	LINDA LORRAINE MOORE	850	533
10*14937	E	5-21-18	JOHN M MOORE AND MELANIE A MOORE	850	524
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10*14300	G	5-21-16	PPG INDUSTRIES, INC.	725	123
10*14300	H	5-21-15	PPG INDUSTRIES, INC.	725	123
10*14498	I	5-28-2	BAYER MATERIALSCIENCE LLC	757	340

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Environmental Protection

01/27/2017

WELL OPERATOR TUG HILL OPERATING, LLC  
ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500  
FORT WORTH, TX 76107

DESIGNATED AGENT DIANNA STAMPER  
CT CORPORATION SYSTEM  
ADDRESS 5400 D BIG TYLER ROAD  
CHARLESTON, WV 25313

WW-6A1  
(5/13)

Operator's Well No. GREER UNIT 1S-2HM

**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
----------------------	-----------------------	-----------------------	---------	-----------

See attached

**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, Inc.  
 By: Jonathan White  
 Its: Regulatory Analyst- Appalachian Region

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 Environmental Protection  
 Page 1 of 6



51-01887

Lease Name or No.	Tag	Parcel	GRANTOR, LESSOR, ECT.	GRANTEE, LESSEE, ECT.	ROYALTY	DEED BOOK/PG		Assignment	Assignment
10*14300	A	5-20-33	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC	1/8+	725	123	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14312	A	5-20-33	JAMIE LU BENSON	GASTAR EXPLORATION USA, INC	1/8+	790	531	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14313	A	5-20-33	TERRI JEAN GODDARD	GASTAR EXPLORATION USA, INC	1/8+	790	585	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14314	A	5-20-33	RALPH BLACHLY	GASTAR EXPLORATION USA, INC	1/8+	790	529	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14315	A	5-20-33	MARGARET ROSS	GASTAR EXPLORATION USA, INC	1/8+	790	527	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14316	A	5-20-33	ANDREW GERST	GASTAR EXPLORATION USA, INC	1/8+	791	645	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14317	A	5-20-33	HAROLD BLACHLY	GASTAR EXPLORATION USA, INC	1/8+	791	643	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14318	A	5-20-33	MARTHA BLACHLY-CROSS	GASTAR EXPLORATION USA, INC	1/8+	792	112	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14319	A	5-20-33	JACK J. PFALZGRAF	GASTAR EXPLORATION USA, INC	1/8+	792	118	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14320	A	5-20-33	SANDRA CHEYNEY	GASTAR EXPLORATION USA, INC	1/8+	792	91	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14321	A	5-20-33	HERBERT BLACHLY	GASTAR EXPLORATION USA, INC	1/8+	792	102	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14322	A	5-20-33	LOIS KAY MORFORD	GASTAR EXPLORATION USA, INC	1/8+	792	110	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14327	A	5-20-33	ROBERT D. OKEY	GASTAR EXPLORATION USA, INC	1/8+	792	646	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC

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 OCT 9 2016  
 WY Department of Environmental Protection

L28310-15

Lease Name or No.	Tag	Parcel	GRANTOR, LESSOR, ECT.	GRANTEE, LESSEE, ECT.	ROYALTY	DEED BOOK/PG		Assignment	Assignment
10*14328	A	5-20-33	RAE ELLEN STUART	GASTAR EXPLORATION USA, INC	1/8+	796	38	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14329	A	5-20-33	TONDA ROTHENBUHLER	GASTAR EXPLORATION USA, INC	1/8+	796	40	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14331	A	5-20-33	CHRISTINA JEAN RIOUX	GASTAR EXPLORATION USA, INC	1/8+	796	70	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14332	A	5-20-33	MICHAEL EDWARD BARTH	GASTAR EXPLORATION USA, INC	1/8+	796	68	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14333	A	5-20-33	DEAN ROTHENBUHLER	GASTAR EXPLORATION USA, INC	1/8+	796	42	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14355	A	5-20-33	DEWAYNE STARKEY	GASTAR EXPLORATION USA, INC	1/8+	815	228	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14356	A	5-20-33	FREDRIC RICHTER & BETTY RICHTER	GASTAR EXPLORATION USA, INC	1/8+	822	270	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14362	A	5-20-33	CAROLYN STARKEY	GASTAR EXPLORATION INC	1/8+	827	226	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14368	A	5-20-33	JOSEPH LONG	GASTAR EXPLORATION INC	1/8+	836	106	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14371	A	5-20-33	THOMAS F LONG AND JENNIFER LONG	GASTAR EXPLORATION INC	1/8+	842	398	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14372	A	5-20-33	UNITED CHURCH HOMES INC	GASTAR EXPLORATION INC	1/8+	846	408	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14377	A	5-20-33	JOSEPH A LONG	GASTAR EXPLORATION INC	1/8+	849	519	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14387	A	5-20-33	JOHN F LONG AND PAM LONG	GASTAR EXPLORATION INC	1/8+	849	542	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14388	A	5-20-33	IMMANUEL CHURCH OF THE UNITED CHURCH OF CHRIST	GASTAR EXPLORATION INC	1/8+	849	513	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14398	A	5-20-33	JAN KAFFENBERGER	GASTAR EXPLORATION INC	1/8+	860	434	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14399	A	5-20-33	RITA ANN DOEBERT AND RONALD DOEBERT	GASTAR EXPLORATION INC	1/8+	860	437	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A

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15-01887

Lease Name or No.	Tag	Parcel	GRANTOR, LESSOR, ECT.	GRANTEE, LESSEE, ECT.	ROYALTY	DEED BOOK/PG		Assignment	Assignment
10*14400	A	5-20-33	COLEEN SLAGLE AND FRANKLIN SLAGLE	GASTAR EXPLORATION INC	1/8+	860	440	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14401	A	5-20-33	IMELDA J SCURLOCK	GASTAR EXPLORATION INC	1/8+	860	443	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14402	A	5-20-33	CAROL F WILSON AND RICHARD WILSON	GASTAR EXPLORATION INC	1/8+	860	446	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14403	A	5-20-33	SUE WHITE	GASTAR EXPLORATION INC	1/8+	862	429	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14404	A	5-20-33	DON FORGRAVES	GASTAR EXPLORATION INC	1/8+	862	426	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14405	A	5-20-33	JOHN WHITE	GASTAR EXPLORATION INC	1/8+	862	423	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14395	A	5-20-33	WILLIAM V BUCKNOR	GASTAR EXPLORATION INC	1/8+	862	421	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14394	A	5-20-33	LESLIE F BUCKNOR	GASTAR EXPLORATION INC	1/8+	862	419	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14408	A	5-20-33	LORNA M LONG MORGAN	GASTAR EXPLORATION INC	1/8+	864	323	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14409	A	5-20-33	JAMES C LONG AND PATTI LONG	GASTAR EXPLORATION INC	1/8+	864	326	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14410	A	5-20-33	HENRY T LONG	GASTAR EXPLORATION INC	1/8+	867	385	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14411	A	5-20-33	THOMAS WHITE, ESQ., SPECIAL COMMISSIONER	GASTAR EXPLORATION INC	1/8+	870	34	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14412	A	5-20-33	THE VILLAGE NETWORK	GASTAR EXPLORATION INC	1/8+	872	203	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14413	A	5-20-33	JUANITA SANDIFER	GASTAR EXPLORATION INC	1/8+	872	206	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14416	A	5-20-33	KATHERINE ANN WILLIAMS COTHRAN	GASTAR EXPLORATION INC	1/8+	879	1	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*14419	A	5-20-33	CROSSROAD CHILD AND FAMILY SERVICES	GASTAR EXPLORATION INC	1/8+	887	105	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
10*15734	A	5-20-33	GENEVIEVE L LONG	TH Exploration, LLC	1/8+	904	13	N/A	N/A
10*16358	A	5-20-33	ANNE MARIE KRAMER	TH Exploration, LLC	1/8+	903	648	N/A	N/A
10*15763	A	5-20-33	BONNIE J. SELDERS	TH Exploration, LLC	1/8+	904	34	N/A	N/A
10*15761	A	5-20-33	CAMERON CEMETERY ASSOCIATION	TH Exploration, LLC	1/8+	903	642	N/A	N/A
10*16356	A	5-20-33	DARYL S. BUCKNOR	TH Exploration, LLC	1/8+	904	31	N/A	N/A

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Lease Name or No.	Tag	Parcel	GRANTOR, LESSOR, ECT.	GRANTEE, LESSEE, ECT.	ROYALTY	DEED BOOK/PG		Assignment	Assignment
10*15762	A	5-20-33	DAWN PETROVICH	TH Exploration, LLC	1/8+	904	4	N/A	N/A
10*16357	A	5-20-33	DEANNA M. CAMPBELL	TH Exploration, LLC	1/8+	904	1	N/A	N/A
10*15760	A	5-20-33	DIEDRE WINGER	TH Exploration, LLC	1/8+	903	645	N/A	N/A
10*15764	A	5-20-33	JAMES E BUCKNOR	TH Exploration, LLC	1/8+	904	28	N/A	N/A
10*16355	A	5-20-33	JAMES P LONG AND LINDA LONG	TH Exploration, LLC	1/8+	904	10	N/A	N/A
10*15765	A	5-20-33	JOHN A BUCKNOR	TH Exploration, LLC	1/8+	904	16	N/A	N/A
10*15766	A	5-20-33	JOHN J. POZENEL	TH Exploration, LLC	1/8+	904	7	N/A	N/A
10*16230	A	5-20-33	TH Exploration, LLC	TH Exploration, LLC	1/8+	900	134	N/A	N/A
10*14381	A	5-20-33	WILLIAM LONG	GASTAR EXPLORATION USA, INC	1/8+	792	95	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14300	B	5-20-34	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC	1/8+	725	123	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14300	B	5-20-34	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC	1/8+	725	123	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14300	C	5-20-32	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC	1/8+	725	123	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14933	D	5-21-19	CLARA LOU HERRICK AND EDWIN A HERRICK	GASTAR EXPLORATION INC	1/8+	850	531	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14934	D	5-21-19	GLENDA ROSE MOORE	GASTAR EXPLORATION INC	1/8+	849	564	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14935	D	5-21-19	JOHN M MOORE AND MELANIE A MOORE	GASTAR EXPLORATION INC	1/8+	849	562	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14936	D	5-21-19	LINDA LORRAINE MOORE	GASTAR EXPLORATION INC	1/8+	850	533	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14937	E	5-21-18	JOHN M MOORE AND MELANIE A MOORE	GASTAR EXPLORATION INC	1/8+	850	524	36/009 Gstar Exploration Inc to TH Exploration II, LLC	N/A
10*14300	F	5-21-17	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC	1/8+	725	123	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC

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Lease Name or No.	Tag	Parcel	GRANTOR, LESSOR, ECT.	GRANTEE, LESSEE, ECT.	ROYALTY	DEED BOOK/PG		Assignment	Assignment
10*14300	G	5-21-16	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC	1/8+	725	123	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14300	H	5-21-15	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC	1/8+	725	123	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC
10*14498	I	5-28-2	BAYER MATERIALSCIENCE LLC	GASTAR EXPLORATION USA, INC	1/8+	757	340	21/41 Cert. of Merger Gstar Exploration USA, Inc to Gstar Exploration Inc	36/009 Gstar Exploration Inc to TH Exploration II, LLC

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STATE OF TEXAS §
COUNTY OF TARRANT § SS

On this 18th day of October, 2016, before me, the undersigned authority, personally appeared David D. Kalish ("Affiant") who being first duly sworn under oath, deposes and saith:

- 1. TH Exploration, LLC, TH Exploration II, LLC and TH Exploration III, LLC are wholly owned subsidiaries of THQ Appalachia I, LLC.
2. Tug Hill Operating, LLC provides oil and gas operations services to THQ Appalachia I, LLC under an Operating Services Agreement dated July 23, 2014.
3. David D. Kalish, the Affiant, is the Vice President of Tug Hill Operating, LLC, THQ Appalachia I, LLC, TH Exploration, LLC, TH Exploration II, LLC and TH Exploration III, LLC, and;
3. Tug Hill Operating, LLC is authorized to operate and maintain the assets owned by THQ Appalachia I, LLC, including, as referenced above, TH Exploration, LLC, TH Exploration II, LLC, and TH Exploration III, LLC, including oil and gas leases, wells, pipelines, surface facilities, and other all other assets that support the business of THQ Appalachia I, LLC, and;
4. Specifically, Tug Hill Operating, LLC is authorized to submit and obtain well work permits and carry out all activities pursuant to such work permits for assets owned by TH Exploration, LLC, TH Exploration II, LLC, TH Exploration III, LLC.

FURTHER, AFFIANT SAITH NOT.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this 18th day of October, 2016.

David D. Kalish
Affiant: David D. Kalish

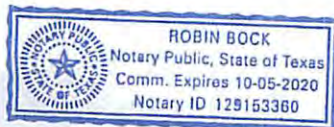
JURAT

Jan Pest
MARSHALL County 03:44:28 PM
Instrument No 1416299
Date Recorded 10/19/2016
Document Type WIS
Pages Recorded 1
Book-Page 20-62
Recording Fee \$5.00
Additional \$6.00

STATE OF TEXAS §
COUNTY OF TARRANT § SS

Sworn and subscribed to (or affirmed) before me on this, the 18th day of October, 2016, by David D. Kalish

IN WITNESS WHEREOF, I hereunto set my hand and official seal.



My Commission Expires: OCT 05 2020
Signature/Notary Public: Robin Bock
Name/Notary Public (Print): Robin Bock

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# TUG HILL

October 22, 2016

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

RE: Greer 1S-2HM

Subject: Marshall County Route 2/2 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 2/2 in the area reflected on the Greer 1S-2HM well plat. THO has conducted a full title search in the relevant Court House to confirm its ownership under said County Route 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 304-689-7676, or by email at [Jwhite@tug-hilop.com](mailto:Jwhite@tug-hilop.com).

Sincerely,

Jonathan White  
Regulatory Analyst – Appalachia Region  
Cell 304-689-7676  
Email: [jwhite@tug-hilop.com](mailto:jwhite@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: 10/28/2016

API No. 47- 051 - 0187  
Operator's Well No. Greer 1S-2HM  
Well Pad Name: Greer

**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>514,018.1</u>
County: <u>Marshall</u>		Northing: <u>4,400,799.0</u>
District: <u>Franklin</u>	Public Road Access: <u>Wayne Ridge Road (County Route 78)</u>	
Quadrangle: <u>Powhatan Point 7.5'</u>	Generally used farm name: <u>PPG Industries, Inc.</u>	
Watershed: <u>(HUC 10) French Creek - Ohio River (UNDEFINED)</u>		

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

<p>Pursuant to West Virginia Code § 22-6A, the Operator has attached proof to this Notice Certification that the Operator has properly served the required parties with the following:</p> <p>*PLEASE CHECK ALL THAT APPLY</p> <p><input type="checkbox"/> 1. NOTICE OF SEISMIC ACTIVITY or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED</p> <p><input checked="" type="checkbox"/> 2. NOTICE OF ENTRY FOR PLAT SURVEY or <input type="checkbox"/> NO PLAT SURVEY WAS CONDUCTED</p> <p><input type="checkbox"/> 3. NOTICE OF INTENT TO DRILL or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NOTICE OF ENTRY FOR PLAT SURVEY WAS CONDUCTED or</p> <p style="padding-left: 100px;"><input type="checkbox"/> WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)</p> <p><input checked="" type="checkbox"/> 4. NOTICE OF PLANNED OPERATION</p> <p><input checked="" type="checkbox"/> 5. PUBLIC NOTICE</p> <p><input checked="" type="checkbox"/> 6. NOTICE OF APPLICATION</p>	<p><b>OOG OFFICE USE ONLY</b></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> <p><b>RECEIVED</b> <b>Office of Oil and Gas</b> <b>OCT 31 2016</b></p>
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**Required Attachments:**

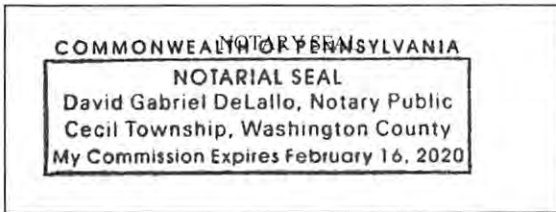
The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class 11 Legal Advertisement with publication 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.

**WV Department of  
Environmental Protection**

**Certification of Notice is hereby given:**

THEREFORE, I Jonathan White, 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 Blvd, Southpointe Plaza II, Suite 200</u>
By:	<u>Jonathan White</u> <i>Jonathan White</i>		<u>Canonsburg, PA 15317</u>
Its:	<u>Regulatory Analyst - Appalachia</u>	Facsimile:	<u>724-338-2030</u>
Telephone:	<u>724-338-2026</u>	Email:	<u>jwhite@tug-hilop.com</u>



Subscribed and sworn before me this 28 day of OCTOBER, 2016.  
*David Gabriel DeLallo*  
 \_\_\_\_\_ Notary Public  
 My Commission Expires 2/16/2020

**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 [deprivacyofficer@wv.gov](mailto:deprivacyofficer@wv.gov).

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

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

**Date of Notice:** 10/28/2016 **Date Permit Application Filed:** 10/28/2016

**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: PPG INDUSTRIES, INC.  
Address: 1 PPG PLACE  
PITTSBURGH, PA 15272

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

SURFACE OWNER(s) (Road and/or Other Disturbance)  
Name: Same as above surface owner  
Address: \_\_\_\_\_

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

SURFACE OWNER(s) (Impoundments or Pits)  
Name: None  
Address: \_\_\_\_\_

COAL OWNER OR LESSEE  
Name: CNX Gas Co.  
Address: 1000 Consol Energy Dr.  
Canonsburg, PA 15317 \*See supplement page

COAL OPERATOR  
Name: None  
Address: \_\_\_\_\_

SURFACE OWNER OF WATER WELL AND/OR WATER PURVEYOR(s)  
Name: None  
Address: \_\_\_\_\_

OPERATOR OF ANY NATURAL GAS STORAGE FIELD  
Name: None  
Address: \_\_\_\_\_

\*Please attach additional forms if necessary

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**OCT 31 2016**  
**WV Department of Environmental Protection**



**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 57<sup>th</sup> Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

**Well Location Restrictions**

Pursuant to W. Va. Code § 22-6A-12, Wells may not be drilled within two hundred fifty feet measured horizontally from any existing water well or developed spring used for human or domestic animal consumption. The center of well pads may not be located within six hundred twenty-five feet of an occupied dwelling structure, or a building two thousand five hundred square feet or larger used to house or shelter dairy cattle or poultry husbandry. This limitation is applicable to those wells, developed springs, dwellings or agricultural buildings that existed on the date a notice to the surface owner of planned entry for surveying or staking as provided in section ten of this article or a notice of intent to drill a horizontal well as provided in subsection (b), section sixteen of this article was provided, whichever occurs first, and to any dwelling under construction prior to that date. This limitation may be waived by written consent of the surface owner transmitted to the department and recorded in the real property records maintained by the clerk of the county commission for the county in which such property is located. Furthermore, the well operator may be granted a variance by the secretary from these distance restrictions upon submission of a plan which identifies the sufficient measures, facilities or practices to be employed during well site construction, drilling and operations. The variance, if granted, shall include terms and conditions the department requires to ensure the safety and protection of affected persons and property. The terms and conditions may include insurance, bonding and indemnification, as well as technical requirements. (b) No well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream, natural or artificial lake, pond or reservoir, or a wetland, or within three hundred feet of a naturally reproducing trout stream. No well pad may be located within one thousand feet of a surface or ground water intake of a public water supply. The distance from the public water supply as identified by the department shall be measured as follows: (1) For a surface water intake on a lake or reservoir, the distance shall be measured from the boundary of the lake or reservoir. (2) For a surface water intake on a flowing stream, the distance shall be measured from a semicircular radius extending upstream of the surface water intake. (3) For a groundwater source, the distance shall be measured from the wellhead or spring. The department may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. (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 that relate to the well location restrictions regarding occupied dwelling structures pursuant to this section. Upon a finding 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 57<sup>th</sup> St. SE  
Charleston, WV 25304  
(304) 926-0450

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

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**Time Limits and Methods for Filing Comments.**

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

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

**Comment Requirements**

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

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

**Permit Denial or Condition**

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

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

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

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

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WW-6A  
(8-13)

API NO. 47- 051 - **01887**  
OPERATOR WELL NO. Greer 1S-2HM  
Well Pad Name: Greer

**Notice is hereby given by:**

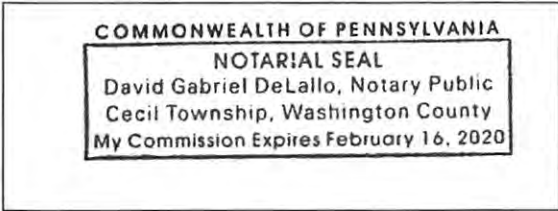
Well Operator: Tug Hill Operating, LLC  
Telephone: 724-338-2026  
Email: jwhite@tug-hillop.com

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

*Jonathan A. White*

**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](mailto:depprivacyofficer@wv.gov).



Subscribed and sworn before me this 28 day of OCTOBER, 2016.

*David Gabriel DeLallo*

Notary Public

My Commission Expires 2/16/2020

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01/27/2017

WW-6A

Supplement Pg. 1A

October 13, 2015  
Tug Hill Operating, LLC  
380 Southpointe Blvd.,  
Southpointe Plaza II, Suite 200  
Canonsburg, PA 15317

## WATER WELL REPORT

Well: Greer 1S-2HM  
District: Franklin  
County: Marshall  
State: WV

There appears to be No ( 0 ) possible water sources within 2,000 feet of the above referenced well location.

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01/27/2017

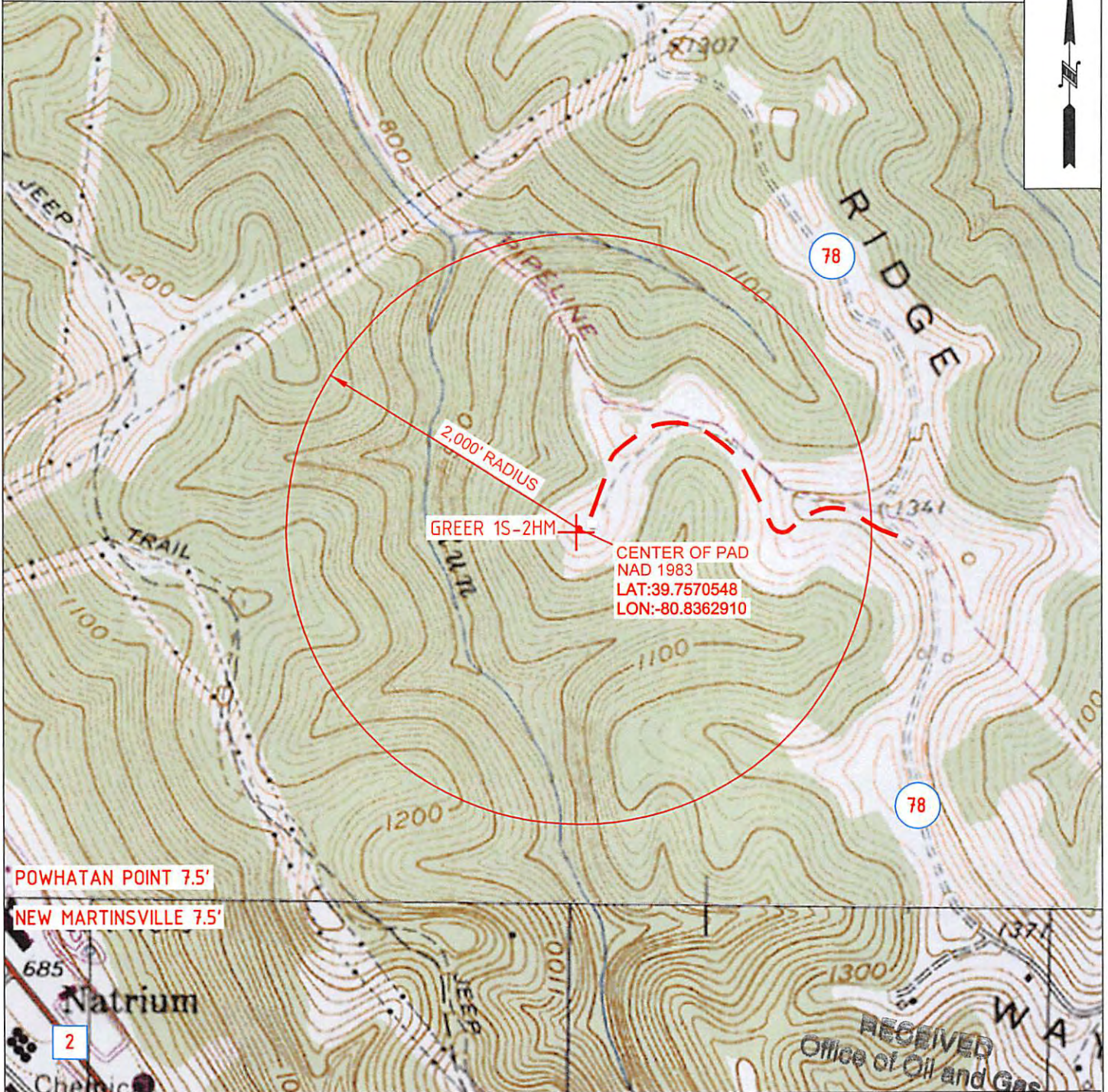


WW-6A

# PROPOSED GREER 1S-2HM

SUPPLEMENT PG 1B

*There appears to be NO ( 0 ) possible water sources within 2,000'.*



POWHATAN POINT 7.5'

NEW MARTINSVILLE 7.5'

685  
Natrium

2

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**TUG HILL**  
OPERATING

OPERATOR **163-697(CEC)**  
TUG HILL OPERATING, LLC  
380 SOUTHPOINTE BLVD  
SUITE 200  
CANONSBURG, PA 15317

TOPO SECTION **OCT 14 2016**  
POWHATAN POINT 7.5'  
SCALE: **1" = 1000'**  
DATE: **01/18/16**

Environmental Protection  
DATE: **01/27/2017**

01/27/2017



Operator Well No. Greer Unit 1S-2HM

**WW-6A Notice of Application**

**Supplement Page**

**Coal Owner(s):**

**Name:** PPG Industries, Inc.  
**Address:** 1 PPG Place  
Pittsburgh, PA 15272

**Name:** Appalachian Power Co.  
**Address:** 1 Riverside Place  
Columbus, OH 43215

**Name:** Harry W. Moore, Sr.  
**Address:** 1300 Fifth Street  
Moundsville, WV 26041-1917

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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:** SEPTEMBER 26, 2016      **Date of Planned Entry:** OCTOBER 3, 2016

**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: PPG INDUSTRIES, INC.

Address: 1 PPG PLACE  
PITTSBURGH, PA 15272

Name: None

Address: \_\_\_\_\_

Name: None

Address: \_\_\_\_\_

COAL OWNER OR LESSEE

Name: PPG INDUSTRIES, INC.

Address: 1 PPG PLACE  
PITTSBURGH, PA 15272      \*See attached

MINERAL OWNER(s)

Name: PPG INDUSTRIES, INC.

Address: 1 PPG PLACE  
PITTSBURGH, PA 15272      \*See attached

\*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>LAT: 39.7569918, LONG: -80.8363553</u>
County: <u>MARSHALL</u>	Public Road Access: <u>WAYNE RIDGE ROAD (COUNTY ROUTE 78)</u>
District: <u>FRANKLIN</u>	Watershed: <u>(HUC 10) FRENCH CREEK- OHIO RIVER (UNDEFINED)</u>
Quadrangle: <u>POWHATAN POINT</u>	Generally used farm name: <u>PPG INDUSTRIES, INC.</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 57<sup>th</sup> 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](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

**Notice is hereby given by:**

Well Operator: TUG HILL OPERATING, LLC

Telephone: 724-338-2026

Email: JWHITE@TUG-HILLOP.COM

Address: 380 SOUTHPOINTE BLVD, SOUTHPOINTE PLAZA II, SUITE 200  
CANONSBURG, PA 15317

Facsimile: 724-338-2030

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**Oil and Gas Privacy Notice:**

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

**OCT 31 2016**  
**WV Department of Environmental Protection**

Operator Well No. Greer 1S-2HM**WW-6A3 Notice of Entry for Plat Survey****Mineral Owner(s):**

**Name:** Cynthia P. Hopkins and John T. Hopkins, Co-Trustees of the Cynthia P. Hopkins Revocable Trust U/T/A

**Address:** 1244 Arbor Road Box 528  
Winston- Salem, NC 27104

**Name:** AMP Acquisition, LLC

**Address:** 225 Ross Street, Suite 301  
Pittsburgh, PA 15219

**Name:** Daniel M. Thomas

**Address:** 2549 Starlite Lane  
Port Charlotte, FL 33952

**Name:** Elizabeth Ann Strausbaugh

**Address:** 11387 Couny Road 550  
Chillicothe, OH 45601

**Name:** Janet Lea Blankenship

**Address:** 1 Cheves Creek Ct.  
North Augusta, SC 29860

**Name:** Daniel Lee Meadows

**Address:** 8109 Maryland Avenue  
Marmet, WV 25315

**Name:** Mary E. Bassett

**Address:** 35475 Hartshorn Ridge Road,  
Graysville, OH 45734

**Name:** Carolyn Starkey

**Address:** HC 60, Box 16  
New Martinsville, WV 26155

**Name:** Dewayne Starkey

**Address:** HC 60, Box 16  
New Martinsville, WV 26155

**Name:** Fredric Richter and Betty Richter

**Address:** 9200 NW 73rd Street  
Tamarac, FL 33321



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**WW-6A3 Notice of Entry for Plat Survey**Operator Well No. Greer 1S-2HM**Mineral Owner(s):**

**Name:** Jamie Lu Benson  
**Address:** 530 N. Main St.  
New Martinsville, WV 26155

**Name:** Lois Kay Morford  
**Address:** 2211 35th St.  
Parkersburg, WV 26104

**Name:** Terri Jean Goddard  
**Address:** 628 4th St.  
New Martinsville, WV 26155

**Name:** Rae Ellen Stuart  
**Address:** 642 N. Main St.  
New Martinsville, WV 26155

**Name:** Michael Edward Barth  
**Address:** 328 Clark St.  
New Martinsville, WV 26155

**Name:** Christina Jean Rioux  
**Address:** 555 North Avenue #16K  
Fort Lee, NJ 07024

**Name:** Immanuel Church of United Church of Christ  
**Address:** 124 Shepherd Place  
Clarington, OH 43915

**Name:** United Church Homes, Inc.  
**Address:** 170 E. Center St.  
Marion, OH 43302

**Name:** Crossroad Child & Family Services, Inc.  
**Address:** 2525 Lake Avenue  
Fort Wayne, IN 46805

**Name:** The Village Network  
**Address:** 2000 Noble Drive  
Wooster, OH 44691

**Name:** Hilary Mae Long  
**Address:** 351 McConnell Ave.  
Zanesville, OH 43701



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**WW-6A3 Notice of Entry for Plat Survey**Operator Well No. Greer 1S-2HM**Mineral Owner(s):**

**Name:** Andrew Gerst  
**Address:** 3352 Meadowood Dr. Apt. 3C  
Zanesville, OH 43701

**Name:** Thomas Long & Jennifer Long  
**Address:** 1153 Paulins Hill Road  
Middleport, OH 45760

**Name:** Joseph A. Long  
**Address:** 577 Schaum Ave.  
Zanesville, OH 43701

**Name:** James P. Long  
**Address:** 5919 Nicolet Ct.  
Crozet VA 22932

**Name:** Dawn Petrovich  
**Address:** 13351 Lehmann Ct.  
Gulfport, MS 39503

**Name:** Deanna Campbell  
**Address:** 4757 Barcelona Ridge Ct.  
Las Vegas, NV 89129

**Name:** Diedre Winger Brown  
**Address:** 23488 Sharon Dr.  
North Olmsted, OH 44070

**Name:** Ana Marie Kramer  
**Address:** 2730 3rd. Avenue  
Sacramento, CA 95818

**Name:** Genevieve Long  
**Address:** 4535 Boggs Rd.  
Zanesville, OH 43701

**Name:** Cameron Cemetery Association  
**Address:** 47126 Sunfish Creek Rd.  
Beallsville, OH 43716

**Name:** Dean Rothenbuhler  
**Address:** 48090 Main St.  
Cameron, OH 43914



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**WW-6A3 Notice of Entry for Plat Survey**Operator Well No. Greer 1S-2HM**Mineral Owner(s):**

**Name:** Tonda Rothenbuhler  
**Address:** 48090 Main St.  
Cameron, OH 43914

**Name:** Sandra Cheyney  
**Address:** 1119 Wales Rd. NE  
Massillon, OH 44646

**Name:** Robert D. Okey  
**Address:** 4716 Strouble Drive NW  
Canton, OH 44718

**Name:** Jack J. Pfalzgraf  
**Address:** 33067 Firehouse Rd.  
Lewisville, OH 43754

**Name:** Ralph Blachly  
**Address:** 1705 Wiltshire Rd.  
Akron, OH 44313

**Name:** Margaret Ross  
**Address:** 11371 Stausser St. NW  
Canal Fulton, OH 44614


**Name:** Harold Blachly  
**Address:** 3723 Lincoln St. E  
Canton, OH 44707

**Name:** Martha Blachy-Cross  
**Address:** 3487 Colletta Lane  
Cleveland, OH 44111

**Name:** Herbert Blachly  
**Address:** 13866 Warwick Dr. NW  
Canal Fulton, OH 44614

**Name:** Bonnie J. Selders  
**Address:** 772 Renninger Rd  
New Franklin, OH 44319

**Name:** Carol F. Wilson and Richard Wilson  
**Address:** 419 S. Patterson St.  
Carey, OH 43316



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**WW-6A3 Notice of Entry for Plat Survey**Operator Well No. Greer 1S-2HM**Mineral Owner(s):**

**Name:** Rita Ann Doebert and Ronald Doebert  
**Address:** 316 Buerger St.  
 Marysville, OH 43040

**Name:** Coleen Slagle and Franklin Slagle, Jr.  
**Address:** 7402 Brownsville Rd.  
 Glenford, OH 43739

**Name:** Juanita Sandifer  
**Address:** 957 Shadow Lake Dr.  
 Ridgeland, MS 39157

**Name:** Daryl S. Bucknor  
**Address:** 129 Park Avenue  
 Lock Haven, PA 17745

**Name:** Leslie F. Bucknor  
**Address:** 7630 Palmer Rd.  
 Pataskala, OH 43062

**Name:** William V. Bucknor  
**Address:** 6620 Kitzmiller Rd.  
 New Albany, OH 43054

**Name:** John A. Bucknor  
**Address:** 150 Summer Pond Trl.  
 Lawrenceville, GA 30046

**Name:** James E. Bucknor  
**Address:** 871 Terrace Trce  
 Lawrenceville, GA 30044


**Name:** Katherine Ann Williams      Cothran  
**Address:** 1649 Quail Run Road  
 Royston, GA 30662

**Name:** John White  
**Address:** 13833 Mount Perry Rd.  
 Mount Perry, OH 43760

**Name:** Jan Kaffenberger aka Mary Jeanette Kaffenberger  
**Address:** P.O. Box 141  
 Glenford, OH 43739

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**WW-6A3 Notice of Entry for Plat Survey**Operator Well No. Greer 1S-2HM**Mineral Owner(s):****Name:** Sue White**Address:** 134 North Main St.  
Roseville, OH 43777**Name:** Lorna M. Long Morgan**Address:** 1529 S. Hunters Dr.  
Newark, OH 43055**Name:** Henry T. Long**Address:** 651 Garden Rd.  
Zanesville, OH 43701**Name:** James C. Long and Patti Long**Address:** 706 Redfox Rd.  
Findlay, OH 45840**Name:** Joseph B. Long**Address:** 5555 Clay Pike  
Chandlersville, OH 43727**Name:** John F. Long and Pam Long**Address:** 116 Wallace Road  
Brunswick, GA 31520**Name:** Don Forgraves**Address:** 4255 Township Rd 121 NW  
Somerset, OH 43783**Name:** Imelda J. Scurlock**Address:** 3445 US Highway 22 NE  
Somerset, OH 43783**Name:** John J. Pozenel**Address:** 3831 S. Susannah Dr.  
Yuma, AZ 85365**Name:** Charles Long, heirs, et al  
(Thomas White, Esq.)**Address:** 604 Sixth Street  
Moundsville, WV 26041

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**WW-6A3 Notice of Entry for Plat Survey**

Operator Well No. Greer 1S-2HM

**Coal Owner(s):**

**Name:** Appalachian Power Co.  
**Address:** 1 Riverside Place  
Columbus, OH 43215

**Name:** CNX Gas Co.  
**Address:** 1000 Consol Energy Dr.  
Canonsburg, PA 15317

**Name:** Harry W. Moore, Sr.  
**Address:** 1300 Fifth Street  
Moundsville, WV 26041-1917



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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: 10/28/2016 Date Permit Application Filed: 10/28/2016

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

- [x] CERTIFIED MAIL RETURN RECEIPT REQUESTED
[ ] HAND 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: PPG Industries, Inc. Name: None
Address: One PPG Place Address:
Pittsburgh, PA 15272

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: West Virginia UTM NAD 83 Easting: 514,018.1
County: Marshall Northing: 4,400,799.0
District: Franklin Public Road Access: Wayne Ridge Road (County Route 78)
Quadrangle: Powhatan Point 7.5' Generally used farm name: PPG Industries, Inc.
Watershed: (HUC 10) French Creek - Ohio River (UNDEFINED)

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 Address: 380 Southpointe Blvd, Southpointe Plaza II, Suite 200
Telephone: 724-338-2026 Canonsburg, PA 15317
Email: jwhite@tug-hillop.com 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.

Office of Oil and Gas
RECEIVED
OCT 31 2016
WV Department of Environmental Protection
01/27/2017



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION  
**Division of Highways**

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

Earl Ray Tomblin  
 Governor

Paul A. Mattox, Jr., P. E.  
 Secretary of Transportation/  
 Commissioner of Highways

September 29, 2016

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

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

Greer 1S-2HM Well  
 Greer 1N-5HU Well  
 Greer 1N-9HM Well  
 Greer 1N-12HU Well

Greer 1S-3HM Well  
 Greer 1N-7HM Well  
 Greer 1N-10HU Well

Greer 1S-4HM Well  
 Greer 1N-8HM Well  
 Greer 1N-11HU Well

Dear Mr. Martin,

This well site will be accessed from Permit #06-2014-0151 transferred to Tug Hill Operating for access to the State Road for a well site located off of Marshall County Route 78 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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 WV Department of  
 Environmental Protection

01/27/2017





**PLANNED ADDITIVES TO BE USED IN FRACTURING OR STIMULATION**

Well No. Greer 1S-2HM

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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Office of Oil and Gas  
OCT 31 2016  
WV Department of  
Environmental Protection

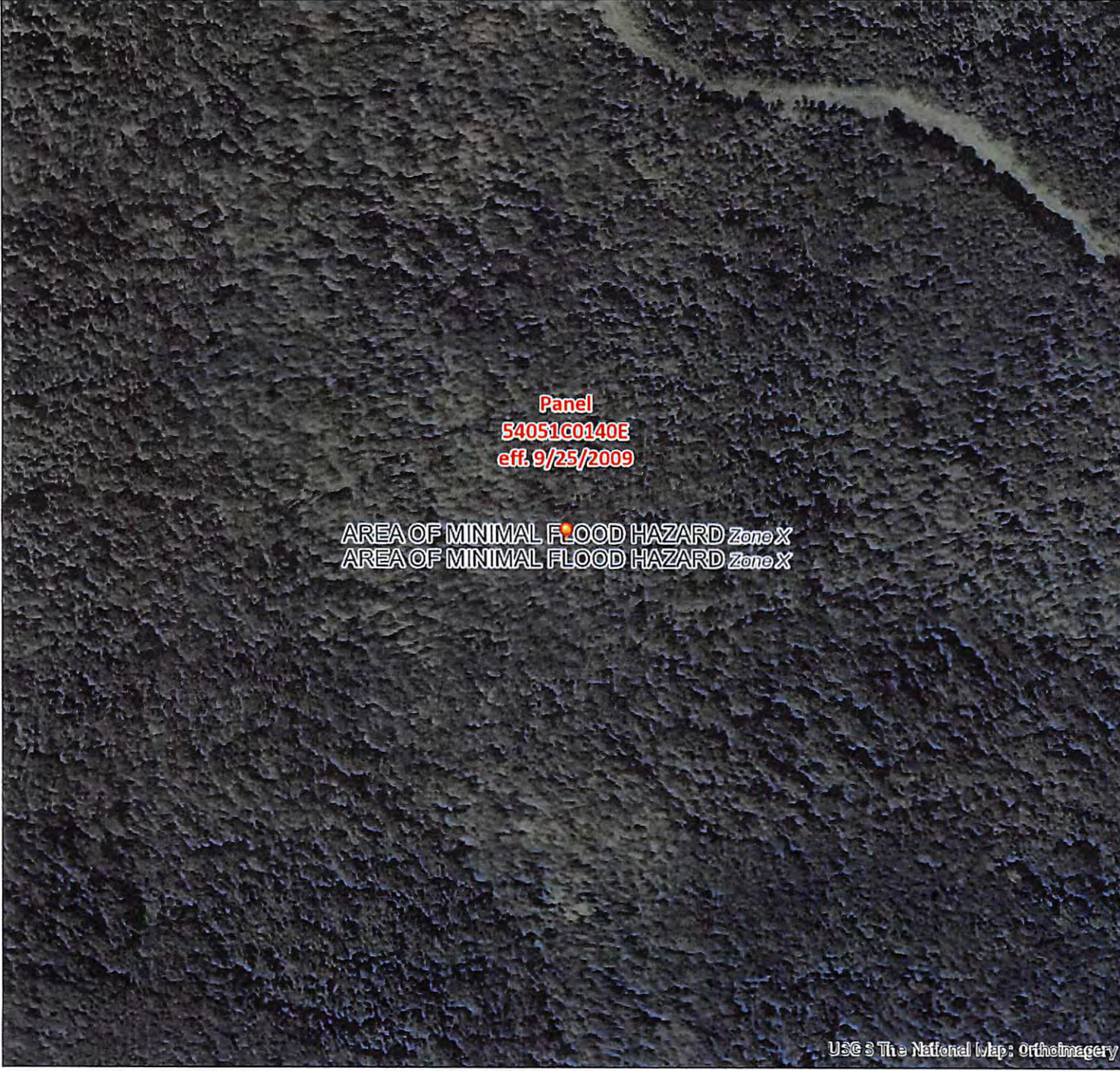


# National Flood Hazard Layer FIRMette

39°45'35.56"N

80°50'31.83"W

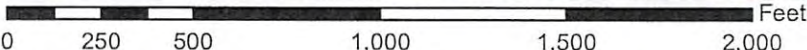
SI-01887



AREA OF MINIMAL FLOOD HAZARD Zone X  
 AREA OF MINIMAL FLOOD HAZARD Zone X

Panel  
 54051C0140E  
 eff. 9/25/2009

USGS The National Map: Orthomagery



39°45'6.71"N

## Legend

- Cross-Sections
- ~ Base Flood Elevations
- Flood Hazard Zones**
  - 1% Annual Chance Flood
  - Regulatory Floodway
  - Special Floodway
  - Area of Undetermined Flood Hazard
  - 0.2% Annual Chance Flood
  - Future Conditions 1% Annual Chance Flood Hazard
  - Area with Reduced Risk Due to Levee



## LOMRs

- Effective

## Map Panels

- Digital Data
- Unmodernized Maps
- Unmapped

This map complies with FEMA's standards for the use of digital flood maps. The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. The base map shown complies with FEMA's base map accuracy standards.

The NFHL is a living database, updated daily, and this map represents a snapshot of information at a specific time.

Flood risks are dynamic and can change frequently due to a variety of factors, including weather patterns, erosion, and new development. FEMA flood maps are continually updated through a variety of processes. Users should always verify through the Map Service Center (<http://msc.fema.gov>) or the Community Map Repository that they have the current effective information.

NFHL maps should not be created for unmapped or unmodernized areas.



# FEMA



# Site Design

Construction Plan, &  
 Erosion Control Plans  
 Final Operating  
 Franklin County  
 in District  
 39.757055°  
 -80.836291°  
 Ohio River Watershed

**Pertinent Site Information**  
**Greer Well Site**  
 Emergency Number: 304-845-1920  
 Marshall County Emergency 911 (Moundsville)  
 Watershed: Stillhouse Run - Ohio River Watershed  
 Tug Hill Contact Number: 1-817-632-3400

4705101887

## Design: Issue for Permitting



WV State Plane Coordinate System  
 North Zone, NAD 83  
 Elevations Based on NAVD83  
 Established By Survey Grade GPS  
 and OPUS Post-Processing

**Property Owner Information - Greer Site Design**

Owner	TM - Parcel	Well Pad	Access Road	Topsoil/Excav	Add. Clearing	Total Disturbed
PPG Industries, Inc	21-24	0.00	1.81	0.00	2.01	3.84
PPG Industries, Inc	20-28	0.20	0.99	0.00	2.12	3.31
PPG Industries, Inc	20-27	0.00	0.07	0.00	0.09	0.16
PPG Industries, Inc	20-29	0.00	0.40	0.81	1.85	3.05
PPG Industries, Inc	20-33	3.18	0.01	0.00	2.22	7.41
<b>Site Totals (Ac)</b>		<b>3.38</b>	<b>3.28</b>	<b>0.81</b>	<b>8.31</b>	<b>17.78</b>

**Access Road**

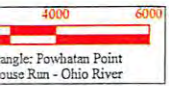
Surface Owner	TM - Parcel	Road Length	Type
PPG Industries, Inc	21-24	1,210.38'	New Access Road Construction
PPG Industries, Inc	20-28	1,009.88'	New Access Road Construction
PPG Industries, Inc	20-27	47.35'	New Access Road Construction
PPG Industries, Inc	20-29	382.14'	New Access Road Construction
PPG Industries, Inc	20-33	38.45'	New Access Road Construction

**Disturbed Area**

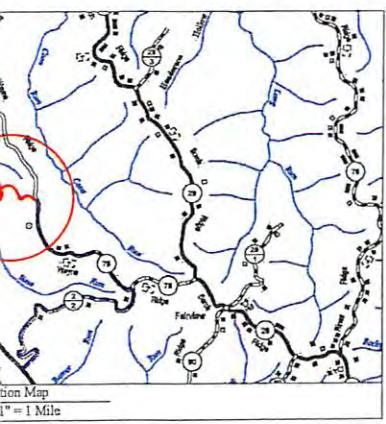
Well Pad Construction	3.38 Ac
Access Road Construction	3.28 Ac
Topsoil / Excess Material	0.81 Ac
Additional Clearing	8.31 Ac
<b>Total Disturbed Area</b>	<b>17.78 Ac</b>
<b>Additional Information</b>	
Total Wooded Acres Disturbed	17.50 Ac
Total Linear Feet of Access Road	2,708.24'

**Greer Site Design Quantities**

Description	Cut (CY)	Fill (CY)	Spill (CY)	Borrow (CY)	Max. Slope	Length of Slope
Well Pad	38,107.02	29,107.08	8,999.94		N/A	N/A
Well Pad Access Road	5,376.54	5,315.81	60.73		14.00%	196.76'
Topsoil/Excess Material Stockpile	0.00	10,000.00		10,000.00	N/A	N/A
<b>Totals</b>	<b>43,483.56</b>	<b>44,422.92</b>	<b>9,060.67</b>	<b>10,000.00</b>		
			<b>-939.36</b>			(Excess Spill Capacity)



Angle: Fowhatan Point  
 house Run - Ohio River



**Design Certification**

The drawings, construction notes and reference diagrams attached hereto have been prepared in accordance with the West Virginia Code of State Rules, Division of Environmental Protection, Office of Oil and Gas 30CSR18.

All Plans, Sheets, and/or Reference Diagrams included in this design constitute a complete set of plans. A complete set of plans is necessary to construct the site in accordance with the design.

John P. Seeley RPE 0011  
 Kelly Surveying PLLC  
 COA: CD1232-00

Date: 08-23-2016

Sheet	Description
1	Cover Sheet
VI	Schedule of Quantities
N1-N3	Site Notes
2	Pre-Construction Site Conditions
3	Clearing Exhibit
4	Overall Plan View
5-7	E&S Plan View
8	Toe Key Exhibit
9-11	Plan View
12	Cross Sections - Well Pad
13	Cross Sections - Access Road
G1-G2	Geotechnical Details
L1	Landowner Disturbed Area Exhibit
S1	Site Reclamation
D1-D2	Erosion and Sediment Control Details
R1	Access Road Details
P1	Pad Details

Revision  
 Design  
 Design: Revised Well Layout  
 Design: Revised Well Layout

Date  
 08-22-2016  
 10-10-2016  
 10-24-2016



THIS DOCUMENT  
 PREPARED FOR  
 TUG HILL  
 OPERATING

**Kelly Surveying**  
 P.O. Box 256  
 Shelby, WV 26039  
 (304) 338-0925

*John P. Seeley*  
 10/25/16  
**RECEIVED**  
 Office of Oil and Gas  
 OCT 31 2016

WV Department of  
 Environmental Protection

Cover Sheet  
**Greer Site Design**  
 Franklin District  
 Marshall County, WV

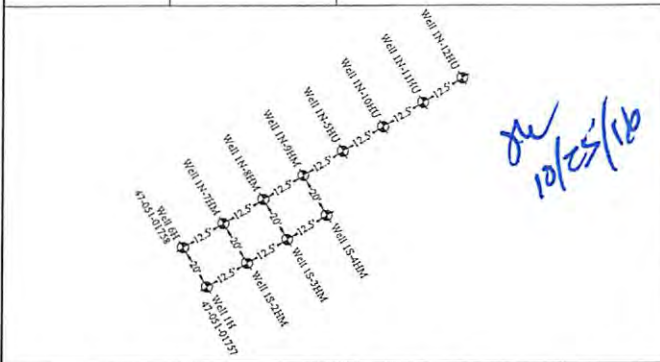
Date: 10/24/2016  
 Scale: As Shown  
 Designed By: ZS  
 File No.  
 Sheet 1 of 13

01/27/2017

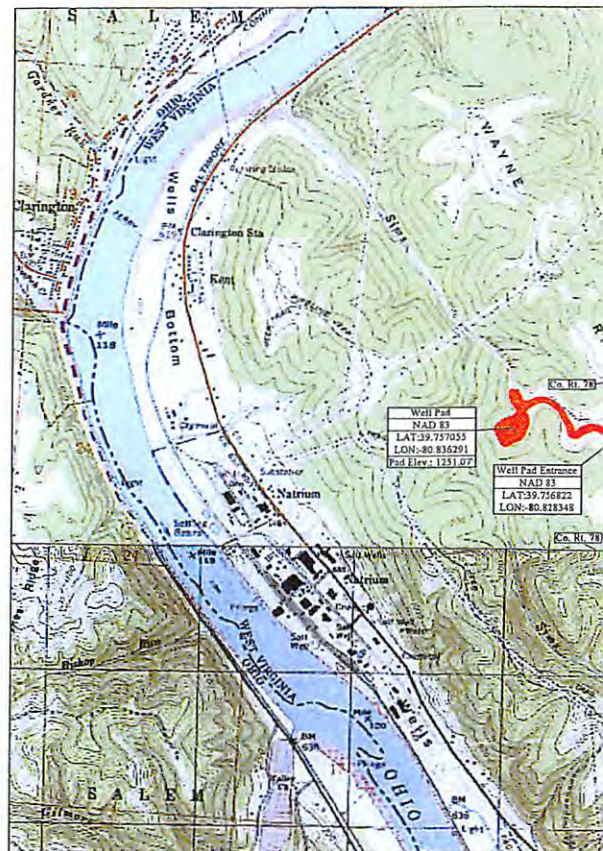




Well Pad Entrance WV-N NAD 83 N: 460534.10 WV-N NAD 83 E: 1595064.00 WV-N NAD 27 N: 460498.23 WV-N NAD 27 E: 1626501.88 Lat. NAD 83: 39.756822 Lon. NAD 83: -80.828348 UTM 17 NAD 83 N: 4400781.53 UTM 17 NAD 83 E: 514704.01	Center of Well Pad WV-N NAD 83 N: 46051.50 WV-N NAD 83 E: 1592832.45 WV-N NAD 27 N: 460616.09 WV-N NAD 27 E: 1624270.37 Lat. NAD 83: 39.757055 Lon. NAD 83: -80.836291 UTM 17 NAD 83 N: 4400806.06 UTM 17 NAD 83 E: 514023.55 Pad Elev.: 1251.07
---	---



Well Table			
<b>Well IN-10HU</b> WV-N NAD 83 N: 460672.06 WV-N NAD 83 E: 1592846.59 WV-N NAD 27 N: 460636.24 WV-N NAD 27 E: 1624284.52 Lat. NAD 83: 39.75711074 Lon. NAD 83: -80.83624172 Lat. NAD 27: 39.75703451 Lon. NAD 27: -80.83645616 UTM 17 NAD 83 N: 4400812.27 UTM 17 NAD 83 E: 514027.76	<b>Well IN-11HU</b> WV-N NAD 83 N: 460678.49 WV-N NAD 83 E: 1592857.31 WV-N NAD 27 N: 460642.58 WV-N NAD 27 E: 1624295.23 Lat. NAD 83: 39.75712884 Lon. NAD 83: -80.83620394 Lat. NAD 27: 39.75705261 Lon. NAD 27: -80.83639309 UTM 17 NAD 83 N: 4400814.29 UTM 17 NAD 83 E: 514030.99	<b>Well IN-11HU</b> WV-N NAD 83 N: 460652.76 WV-N NAD 83 E: 1592814.44 WV-N NAD 27 N: 460616.93 WV-N NAD 27 E: 1624252.37 Lat. NAD 83: 39.75705643 Lon. NAD 83: -80.83635565 Lat. NAD 27: 39.75699823 Lon. NAD 27: -80.8363949 UTM 17 NAD 83 N: 4400806.23 UTM 17 NAD 83 E: 514031.06	<b>Well IN-11HU</b> WV-N NAD 83 N: 460635.51 WV-N NAD 83 E: 1592842.73 WV-N NAD 27 N: 460599.90 WV-N NAD 27 E: 1624265.66 Lat. NAD 83: 39.75702990 Lon. NAD 83: -80.83631754 Lat. NAD 27: 39.75695167 Lon. NAD 27: -80.83646490 UTM 17 NAD 83 N: 4400803.07 UTM 17 NAD 83 E: 514024.52



**Project Contacts**

**Tag Hill Operating**  
Jonathan White - Regulatory Analyst  
724-85-2009 OIF, 304-659-7676 Cell  
Geoff Radler - V.P. Production  
817-532-5200 OIF

**Survey and Engineer**  
Kenneth Kelly  
304-338-6985 OIF  
John P. See  
304-442-0220 OIF  
Zachary Summerfield  
304-338-6987 OIF

**Geotechnical Engineer**  
American Geotech, Inc.  
Kanzi Patel  
304-340-4277 OIF

**Environmental:**  
An environmental study was not provided for the purpose of this design

**Topographic Information:**  
The topographic information shown herein is based on aerial photography by Blue Mountain Aerial Mapping, Burton, WV

**MISS UTILITY OF WEST VIRGINIA**  
1-800-245-4848  
West Virginia State Law Section XIV, Chapter 24-C requires that you call the Miss Utility 811 before you dig in the state of West Virginia. IT'S THE LAW

**811**  
Know what's Below. Call before you dig.

**Approach Routes:**  
From the intersection of WV Rt 2 and OH Rt 7 in New Martinsville, WV, travel North on WV Rt 2 for 6.0 mi. Turn right onto Co Rt 2/2 (Wells Hill Road). Follow Co Rt 2/2 for 2.4 mi. Turn Left onto Co Rt 78 (Waynes Ridge Road). Follow Co Rt 78 for 1.8 mi. The site entrance will be on the Left (West) side of the road.

**Well Location Restrictions**  
All Pad construction complies with the following restrictions.  
 •250' from an existing well or developed spring used for human or domestic animals.  
 •625' from an occupied dwelling or barn greater than 2,500 SF used for poultry or dairy measured from the center of the pad.  
 •100' from the edge of disturbance to wetlands, perennial streams, natural or artificial lake, pond or reservoir.  
 •300' from the edge of disturbance to a naturally reproducing trout stream.  
 •1,000' of a surface or ground water intake to a public water supply.  
 (Well Location Restrictions of WV Code 22-6A-12)

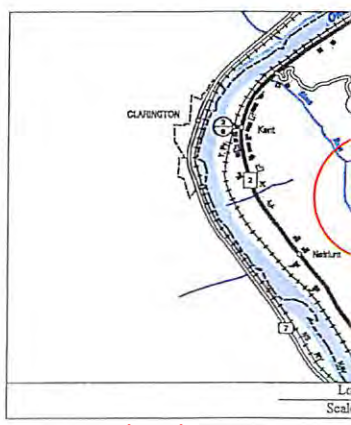
Tag Hill Operating will obtain an Encroachment Permit (Form MM-109) from the WV Department of Transportation, Division of Highways, prior to the commencement of any construction activities

The WV Mines Website was consulted. Previous (Current) mining activities are (XXXXXX) within the AOL

WVDEP Website file shows that there are XXX active and/or abandoned gas wells within the AOL

**Floodplain Conditions**

Do site construction activities take place in a floodplain:	NO
Permit needed from county floodplain coordinator:	NO
Flood Hazard Zone:	X
HEC-RAS Study completed:	N/A
Floodplain shown on drawing:	N/A
FIRM Map Number(s) for site:	54931C 0140E
Percentage of construction in floodplain:	N/A



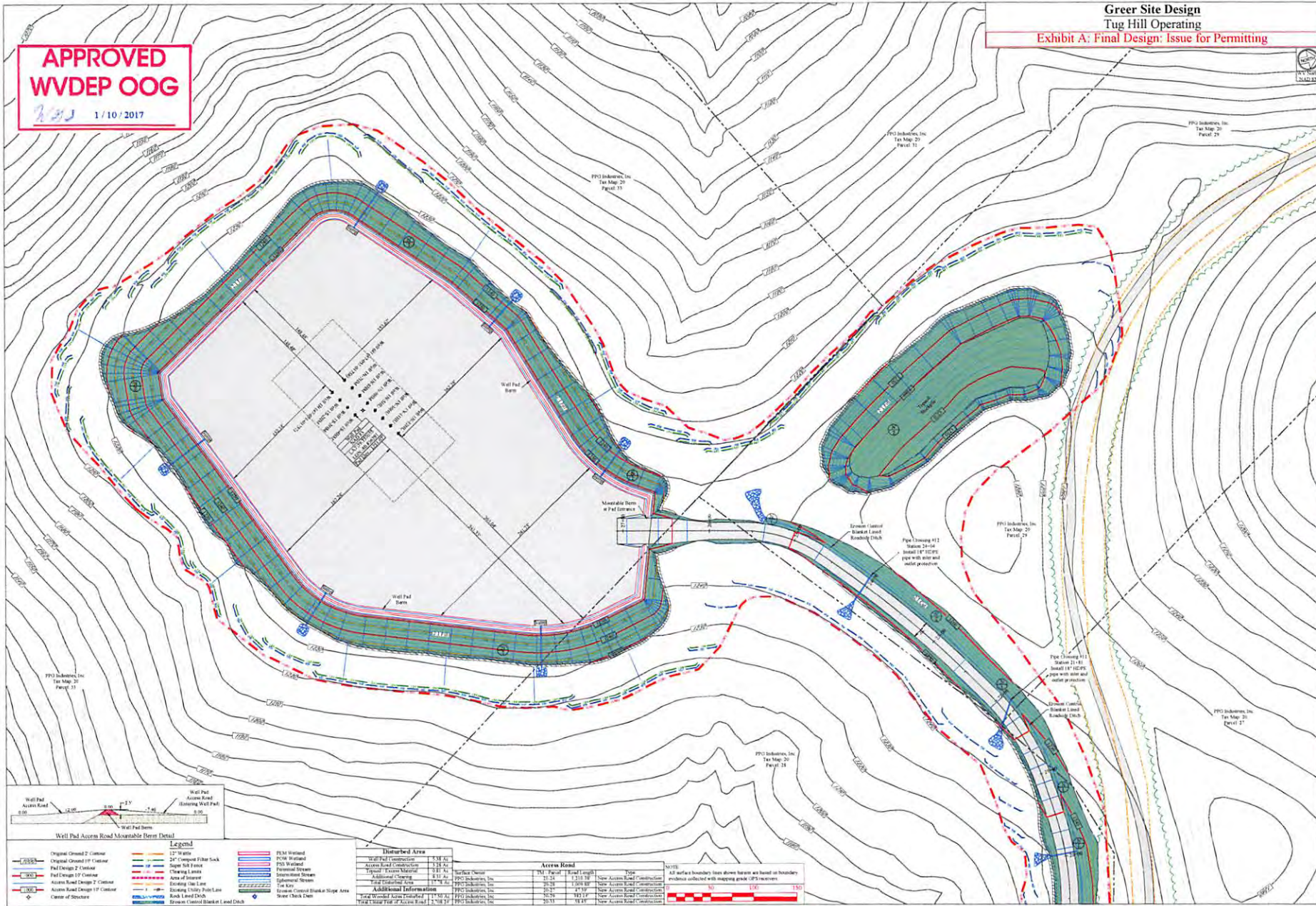






**Greer Site Design**  
**Tug Hill Operating**  
**Exhibit A: Final Design: Issue for Permitting**

**APPROVED**  
**WVDEP OOG**  
 200 1 / 10 / 2017



**Legend**

Original Contour 2' Contour	12" W well	PPG Wetland
Original Contour 10' Contour	24" Composite Filter Sock	PPG Wetland
Pad Design 2' Contour	Super Roll Fence	PPG Wetland
Pad Design 10' Contour	Chaining Lanes	PPG Wetland
Access Road Design 2' Contour	Area of Impact	PPG Wetland
Access Road Design 10' Contour	Existing Utility Line	PPG Wetland
Access Road Design 17' Contour	Existing Utility Pole Line	PPG Wetland
Center of Structure	Rock Level Ditch	PPG Wetland
	Stream Control Blanket & Lead Ditch	PPG Wetland
	Water Check Dam	PPG Wetland

**Disturbed Area**

Well Pad Construction	5.58 AC
Access Road Construction	1.24 AC
Yard - Access Material	78.1 AC
Additional Clearing	8.11 AC
Final Disturbed Area	93.03 AC

**Access Road**

Surface Owner	WV Parcel #	Parcel Length	Type
PPG Industries, Inc.	20-24	1,213.78'	New Access Road Construction
PPG Industries, Inc.	20-25	1,208.88'	New Access Road Construction
PPG Industries, Inc.	20-26	87.93'	New Access Road Construction
PPG Industries, Inc.	20-27	183.17'	New Access Road Construction
PPG Industries, Inc.	20-28	18.41'	New Access Road Construction

**Additional Information**

PPG Industries, Inc. Parcel 11  
 PPG Industries, Inc. Parcel 12  
 PPG Industries, Inc. Parcel 13  
 PPG Industries, Inc. Parcel 14  
 PPG Industries, Inc. Parcel 15  
 PPG Industries, Inc. Parcel 16  
 PPG Industries, Inc. Parcel 17  
 PPG Industries, Inc. Parcel 18  
 PPG Industries, Inc. Parcel 19  
 PPG Industries, Inc. Parcel 20  
 PPG Industries, Inc. Parcel 21  
 PPG Industries, Inc. Parcel 22  
 PPG Industries, Inc. Parcel 23  
 PPG Industries, Inc. Parcel 24  
 PPG Industries, Inc. Parcel 25  
 PPG Industries, Inc. Parcel 26  
 PPG Industries, Inc. Parcel 27  
 PPG Industries, Inc. Parcel 28  
 PPG Industries, Inc. Parcel 29  
 PPG Industries, Inc. Parcel 30

**Notes**

All surface boundaries shown herein are based on boundaries produced by mapping grade GPS receivers.

08-23-2016  
 10-15-2016  
 10-26-2016  
 01-26-2017

Design: Matthew Hill, Layton  
 Design: Matthew Hill, Layton  
 Design: Matthew Hill, Layton  
 Design: Matthew Hill, Layton

**TUG HILL OPERATING**

THIS DOCUMENT PREPARED FOR  
**TUG HILL OPERATING**

**K+S**  
 1000 W. Main Street  
 Charleston, WV 25302

Site Plan  
**Greer Site Design**  
 Franklin District  
 Marshall County, WV

Date: 10/24/2016  
 Scale: As Shown  
 Designed by: JZS  
 Date: 10/24/2016  
 Sheet 11 of 13