



west virginia department of environmental protection

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

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

December 7, 2016
PERMIT MODIFICATION APPROVAL
Horizontal 6A / Horizontal 6A Well

TUG HILL OPERATING, LLC
1320 SOUTH UNIVERSITY DRIVE, SUITE 500

FORT WORTH , TX 76107

Re: Permit Modification Approval for GREER 1H
47-051-01757-00-00

Lateral Well Bore Path Modification

TUG HILL OPERATING, LLC

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
Chief

Operator's Well Number: GREER 1H
Farm Name: PPG INDUSTRIES, INC.
U.S. WELL NUMBER: 47-051-01757-00-00
Horizontal 6A / Horizontal 6A Well
Date Issued: December 7, 2016

Promoting a healthy environment.

12/09/2016

PERMIT CONDITIONS

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

CONDITIONS

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

RECEIVED
Office of Oil and Gas

WW-6B
(04/15)

OCT 24 2016

API NO. 47-051 - 01757 M&D
OPERATOR WELL NO. 1H
Well Pad Name: Greer

WV Department of
Environmental Protection

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: 1H 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: 1271' Elevation, proposed post-construction: 1251'

5) Well Type (a) Gas Oil Underground Storage

Other

(b) If Gas Shallow Deep

Horizontal

M 10/16/16

6) Existing Pad: Yes or No No

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: 6506'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 14667'

11) Proposed Horizontal Leg Length: 7339'

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: 1740'

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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WW-6B
(04/15)

OCT 24 2016

API NO. 47- 051 - 01757 MOO
OPERATOR WELL NO. 1H
Well Pad Name: Greer

WV Department of
CASING AND TUBING PROGRAM
Environmental Protection

18)

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	20"	NEW	PE	54.5#		120'	61FT^3(CTS)
Fresh Water	13 3/8"	NEW	H40	48#		1000'	870ft^3(CTS)
Coal	13 3/8"	NEW	H40	48#		1000'	870ft^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#		2600'	845ft^3(CTS)
Production	5 1/2"	NEW	P110	20#		14667'	3459ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#		6910'	
Liners							

ju 10/16/16

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	20"	26"	.25	880	700	CLASS A	1.2
Fresh Water	13 3/8"	17"	.33	1730	1384	SEE #24	1.2
Coal	13 3/8"	17	.33	1730	1384	SEE#24	1.2
Intermediate	9 5/8"	12 1/4"	.352	3520	2816	SEE#24	1.2
Production	5 1/2"	8 7/8_8 3/4	.361	12,640	10,112	SEE#24	1.17
Tubing	2 3/8"		.19	11,200	8960		
Liners							

PACKERS

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

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WW-6B
(10/14)

OCT 24 2016

API NO. 47-051 - 01757 MCD
OPERATOR WELL NO. 1H
Well Pad Name: Greer

WV Department of
Environmental Protection

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 (TBD). Drill the horizontal section to planned and proposed TD. Run casing and cement to surface. Run Bond Log from app 60 deg to surface. Make clean out run and stimulate

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

Well to be completed with approximately 18,347,500 lb proppant and 282,552 bbl of water. Max rate = 80 bpm; max psi = 9,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 24.42 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 7 centralizers at 300' spacing. 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:

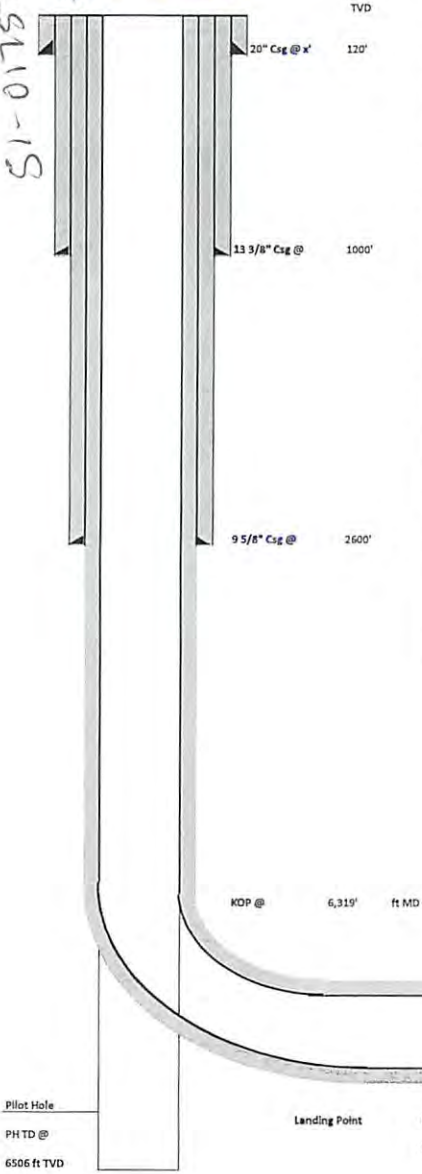
Class A+2 CaCl₂+1/4#Flake-Surface cement mixed 15.6ppg, CaCl₂(calcium Chloride), Flake(cellophane flake)
Class A+1 CaCl₂+1/4#Flake-Intermediate Cement mixed 15.6ppb, 50:50 Class H .2 CD32 1.2 FL62, .1
ASA301 >4 SMS-Long String mixes 14.5 ppg, CD32(cement dispersant) FL 62 (fluid loss)SMS (sodium metasilicate) ASA (minimizes free fluid) 50:50 Type1 .4 R3 1 FL62 .15 ASA301 .3 CD32-tali mixed 14.5 ppg

25) Proposed borehole conditioning procedures:

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

*Note: Attach additional sheets as needed.

51-01757 Nov



WELL NAME:	Greer 1H	STATE:	WV	COUNTY:	Marshall
DISTRICT:	Franklin	DF Elev:	1276 ft	GL Elev:	1251 ft
TD:	14,667 ft	TH Latitude:	39.756974	TH Longitude:	-80.836393
BH Latitude:	39.771603	BH Longitude:	-80.856669		

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	860
Sewickley Coal	756
Pittsburgh Coal	850
Big Lime	1936
Weir Sandstone	2325
Berea Sandstone	2515
Gordon Sandstone	2875
Rhinestreet Shale	5772
Genesee Shale	6290
Tully Limestone	6304
Hamilton Shale	6318
Marcellus Shale	6350
Landing Depth	6363
Onondaga	6406

CASING SUMMARY						
Type	Hole Size (in)	Csg Size (in)	Depth (ft)	Weight (lb/ft)	Grade	Top of Cement
Conductor	26	20	120'	54.5	PE	Surface
Surface	17	13 3/8	1000'	48	H40	Surface
Intermediate 1	12 1/4	9 5/8	2600'	36	J55	Surface
Production	8 7/8, 8 3/4	5 1/2	14667	20	P110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	51	A	15.6	Air	None
Surface	725	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	704	A	15.6	Air	7 centralizers at 300' spacing
Production	2,956	A	14.5	Air / SOBMM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc

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JW 8/19/16

Pilot Hole					
PHTD @	Landing Point	6363 ft TVD	Lateral TD @	6235 ft TVD	
6506 ft TVD		7328 ft MD		14667 ft MD	

SI-01157 MB



global environmental solutions

Well Site Safety Plan

Tug Hill Operating, LLC

JM
8/19/16

Well Name: Greer 1H

Pad Location: Greer Pad

Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:

Northing – 4,400,797.0

Easting – 514,014.8

SLR Ref: 116.01631.00002

August 2016



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OPERATING

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12/09/2016

Area of Review

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

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

Data Sources Reviewed:

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

Contacted Devin Ducoeur 724-705-0444, dducoeur@dpslandservices.com DPS GIS (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

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
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See Attached

**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

By: Jonathan White *Jonathan White*

Its: Regulatory Analyst - Appalachia Region

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Lease Name or No.	Tag	Parcel	Grantor, Lessor, ect.	Grantee, Lessee, ect.	Royalty	Deed Book/Pg		Assignment	Assignment
WV16-0076-001	A	5-20-33	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC.	1/8+	725	123	21/41 Cert. of Merger Gastar Exploration USA, Inc to Gastar Exploration Inc	36/009 Gastar Exploration Inc to TH Exploration II, LLC
WV16-0076-001	B	5-20-34	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC.	1/8+	725	123	21/41 Cert. of Merger Gastar Exploration USA, Inc to Gastar Exploration Inc	36/009 Gastar Exploration Inc to TH Exploration II, LLC
WV16-0076-001	C	5-20-31	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC.	1/8+	725	123	21/41 Cert. of Merger Gastar Exploration USA, Inc to Gastar Exploration Inc	36/009 Gastar Exploration Inc to TH Exploration II, LLC
WV16-0076-001	D	5-20-30	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC.	1/8+	725	123	21/41 Cert. of Merger Gastar Exploration USA, Inc to Gastar Exploration Inc	36/009 Gastar Exploration Inc to TH Exploration II, LLC
WV16-0076-068	D	5-20-30	DAN J. SWOVELAND	GASTAR EXPLORATION INC.	1/8+	827	523	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-069	D	5-20-30	CARRIE E METZGER FKA CARRIE ELIZABETH CHAMBERS	GASTAR EXPLORATION INC.	1/8+	833	527	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-070	D	5-20-30	CHRISTINA CHAMBERS	GASTAR EXPLORATION INC.	1/8+	836	123	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-071	D	5-20-30	JOSEPH LONG	GASTAR EXPLORATION INC.	1/8+	836	106	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-117	D	5-20-30	DAVID C WHITE, ESQ., SPECIAL COMMISSIONER ON BEHALF OF D.W. CHESSE OR HIS HEIRS, SUCCESSORS, ASSIGNS, DEVISEES, OR DISTRIBUTUTES	GASTAR EXPLORATION INC.	1/8+	872	217	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-063	D	5-20-30	ALLEN D. MASON	GASTAR EXPLORATION INC.	1/8+	827	276	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-064	D	5-20-30	RODNEY K. CHAMBERS	GASTAR EXPLORATION INC.	1/8+	827	271	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-065	D	5-20-30	CAROLYN STARKEY	GASTAR EXPLORATION INC.	1/8+	827	226	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-066	D	5-20-30	CHRISTINA I. CHILCOTE	GASTAR EXPLORATION INC.	1/8+	827	525	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-067	D	5-20-30	DAWN M. LAEMMIE	GASTAR EXPLORATION INC.	1/8+	827	521	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-058	D	5-20-30	GLENN L. MASON & SANDRA K. MASON	GASTAR EXPLORATION INC.	1/8+	822	256	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-059	D	5-20-30	FREDRIC RICHTER & BETTY RICHTER	GASTAR EXPLORATION USA, INC.	1/8+	822	270	21/41 Cert. of Merger Gastar Exploration USA, Inc to Gastar Exploration Inc	36/009 Gastar Exploration Inc to TH Exploration II, LLC
WV16-0076-060	D	5-20-30	JORLENE POST	GASTAR EXPLORATION INC.	1/8+	827	280	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-061	D	5-20-30	CHRIS H. STEVENSON	GASTAR EXPLORATION INC.	1/8+	827	282	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-062	D	5-20-30	LUCYBELLE WELDON	GASTAR EXPLORATION INC.	1/8+	827	278	36/009 Gastar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-053	D	5-20-30	NORA WEBB	GASTAR EXPLORATION USA, INC.	1/8+	805	78	21/41 Cert. of Merger Gastar Exploration USA, Inc to Gastar Exploration Inc	36/009 Gastar Exploration Inc to TH Exploration II, LLC

WV Department of Environmental Protection

12/09/2016

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Aug 24 2016

Lease Name or No.	Tag	Parcel	Grantor, Lessor, ect.	Grantee, Lessee, ect.	Royalty	Deed Book/Pg		Assignment	Assignment
WV16-0076-054	D	5-20-30	BRIAN K. MARMIE & CAROL L. MARMIE	GASTAR EXPLORATION USA, INC.	1/8+	805	76	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-055	D	5-20-30	KARI B. MARMIE	GASTAR EXPLORATION USA, INC.	1/8+	809	515	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-056	D	5-20-30	TRAVIS D. MARMIE	GASTAR EXPLORATION USA, INC.	1/8+	808	491	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-057	D	5-20-30	DEWAYNE STARKEY	GASTAR EXPLORATION USA, INC.	1/8+	815	228	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-047	D	5-20-30	SHARON D. GREEN	GASTAR EXPLORATION USA, INC.	1/8+	799	463	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-048	D	5-20-30	LAURA GLASSNER	GASTAR EXPLORATION USA, INC.	1/8+	800	406	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-049	D	5-20-30	TERRY I. CHAMBERS	GASTAR EXPLORATION USA, INC.	1/8+	800	404	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-050	D	5-20-30	GEORGEANN TIPPY	GASTAR EXPLORATION USA, INC.	1/8+	803	152	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-051	D	5-20-30	HOWARD A. BROWN	GASTAR EXPLORATION USA, INC.	1/8+	805	98	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-052	D	5-20-30	RAE JEAN NAMETH	GASTAR EXPLORATION USA, INC.	1/8+	805	80	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-041	D	5-20-30	JOANN FRAZIER	GASTAR EXPLORATION USA, INC.	1/8+	799	59	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-042	D	5-20-30	JOSEPH CHAMBERS	GASTAR EXPLORATION USA, INC.	1/8+	799	450	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-043	D	5-20-30	ROBERT MARMIE	GASTAR EXPLORATION USA, INC.	1/8+	799	455	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-044	D	5-20-30	FLORENCE L. MYERS	GASTAR EXPLORATION USA, INC.	1/8+	799	457	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-045	D	5-20-30	BARBARA METZNER	GASTAR EXPLORATION USA, INC.	1/8+	799	459	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-046	D	5-20-30	LYNNETTE L. KUGLER	GASTAR EXPLORATION USA, INC.	1/8+	799	461	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC
WV16-0076-012	D	5-20-30	COLLIN A. WILLISON III	GASTAR EXPLORATION USA, INC.	1/8+	789	577	21/41 Cert. of Merger Gatar Exploration USA, Inc to Gatar Exploration Inc	36/009 Gatar Exploration Inc to TH Exploration II, LLC

Lease Name or No.	Tag	Parcel	Grantor, Lessor, ect.	Grantee, Lessee, ect.	Royalty	Deed Book/Pg		Assignment	Assignment
WV16-0076-032	D	5-20-30	LETITIA TEMPLE	GASTAR EXPLORATION USA, INC.	1/8+	799	465	21/41 Cert. of Merger Gasar Exploration USA, Inc to Gasar Exploration Inc	36/009 Gasar Exploration Inc to TH Exploration II, LLC
WV16-0076-037	D	5-20-30	MARY C. JOSEPH	GASTAR EXPLORATION USA, INC.	1/8+	797	196	21/41 Cert. of Merger Gasar Exploration USA, Inc to Gasar Exploration Inc	36/009 Gasar Exploration Inc to TH Exploration II, LLC
WV16-0076-038	D	5-20-30	MARSHA L. SCHON	GASTAR EXPLORATION USA, INC.	1/8+	797	198	21/41 Cert. of Merger Gasar Exploration USA, Inc to Gasar Exploration Inc	36/009 Gasar Exploration Inc to TH Exploration II, LLC
WV16-0076-039	D	5-20-30	WILLIAM M. DOYLE	GASTAR EXPLORATION USA, INC.	1/8+	797	187	21/41 Cert. of Merger Gasar Exploration USA, Inc to Gasar Exploration Inc	36/009 Gasar Exploration Inc to TH Exploration II, LLC
WV16-0076-040	D	5-20-30	LOIS JEAN MYERS	GASTAR EXPLORATION USA, INC.	1/8+	797	189	21/41 Cert. of Merger Gasar Exploration USA, Inc to Gasar Exploration Inc	36/009 Gasar Exploration Inc to TH Exploration II, LLC
WV16-0076-001	E	5-20-22	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC.	1/8+	725	123	21/41 Cert. of Merger Gasar Exploration USA, Inc to Gasar Exploration Inc	36/009 Gasar Exploration Inc to TH Exploration II, LLC
WV16-0185-001	E	5-20-22	ROGER R WEESE, SPECIAL COMMISSIONER ON BEHALF OF EMMA W STANDIFORD, MARY WILSON CRAMER, JANE TAYLOR, MAY BRIDENBECKER, ROSEBERRY L WILSON, ANNIE WILSON, BEATRICE WILSON KERLIN, COURTNEY T WILSON, GUY WILSON, CALLIE WILSON GATES, JAMES C WILSON, H L WILSO	GASTAR EXPLORATION INC.	1/8+	836	488	36/009 Gasar Exploration Inc to TH Exploration II, LLC	N/A
WV16-0076-001	F	5-20-21	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC.	1/8+	725	123	21/41 Cert. of Merger Gasar Exploration USA, Inc to Gasar Exploration Inc	36/009 Gasar Exploration Inc to TH Exploration II, LLC
WV16-0076-001	G	5-13-2	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC.	1/8+	725	123	21/41 Cert. of Merger Gasar Exploration USA, Inc to Gasar Exploration Inc	36/009 Gasar Exploration Inc to TH Exploration II, LLC
WV16-0076-001	H	5-13-5	PPG INDUSTRIES, INC.	GASTAR EXPLORATION USA, INC.	1/8+	725	123	21/41 Cert. of Merger Gasar Exploration USA, Inc to Gasar Exploration Inc	36/009 Gasar Exploration Inc to TH Exploration II, LLC
WV16-0142-000	I	5-13-8	PAUL F. SPOTTS	GASTAR EXPLORATION USA, INC.	1/8+	779	482	21/41 Cert. of Merger Gasar Exploration USA, Inc to Gasar Exploration Inc	36/009 Gasar Exploration Inc to TH Exploration II, LLC

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Office of Oil and Gas

AUG 24 2016

WV Department of
Environmental Protection
Page 4 of 4
12/09/2016

AFFIDAVIT

STATE OF TEXAS §
§ SS
COUNTY OF TARRANT §

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

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

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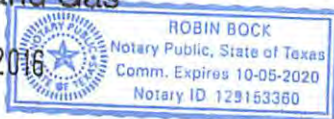
STATE OF TEXAS §
§ SS
COUNTY OF TARRANT §

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.

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Office of Oil and Gas

OCT 24 2016



My Commission Expires: 10-05-2020

Signature/Notary Public: Robin Bock

Name/Notary Public (Print): Robin Bock

WV Department of
Environmental Protection

51-01757



TUG HILL

August 12, 2016

WVDEP-Office of Oil & Gas
Attn: Laura Adkins
601 57th Street SE
Charleston, WV 25304

VIA: Registered mail

Subject: Greer Well No.1H API# 47-051-01757 (Permit Modification), located in Meade District, Marshall County, WV

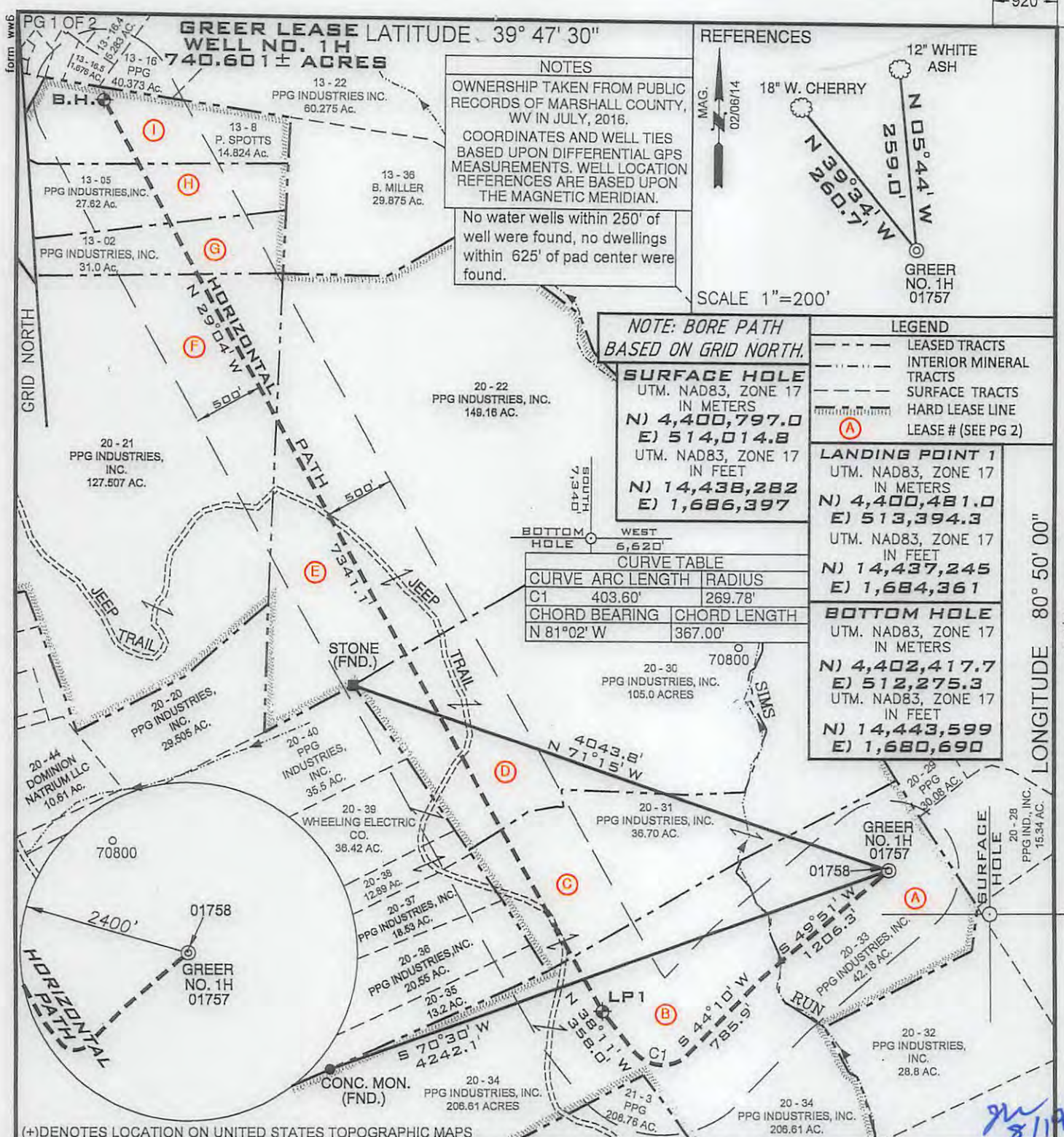
Dear Laura:

Tug Hill Operating, LLC will not be drilling, extracting or producing any minerals under any WV County or State Routes in the area reflected on the Greer Well No.1H (Permit Modification) well plat. 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.

Sincerely,

Jonathan White
Regulatory Analyst – Appalachia Region
Cell 304-689-7676
Email: jwhite@tug-hilop.com

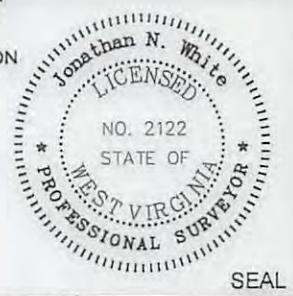
-920'



FILE NUMBER W0120319 (WB1-76)
 DRAWING NUMBER GREER_WP_1H_REV1
 SCALE 1" = 1000'
 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



MARCH 14, 2014
 DATE: JULY 25, 2016 REV1
 OPERATORS WELL NO. GREER NO. 1H
 API WELL NO. 47-051-01757 H6A
 STATE COUNTY PERMIT WV

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
 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 740.601
 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:14,667'
 WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DIANNA STAMPER
 ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 ADDRESS 5400 D BIG TYLER ROAD
FORT WORTH TX, 76107 CHARLESTON WV, 25313

12/09/2016

COUNTY NAME PERMIT

form. wv6

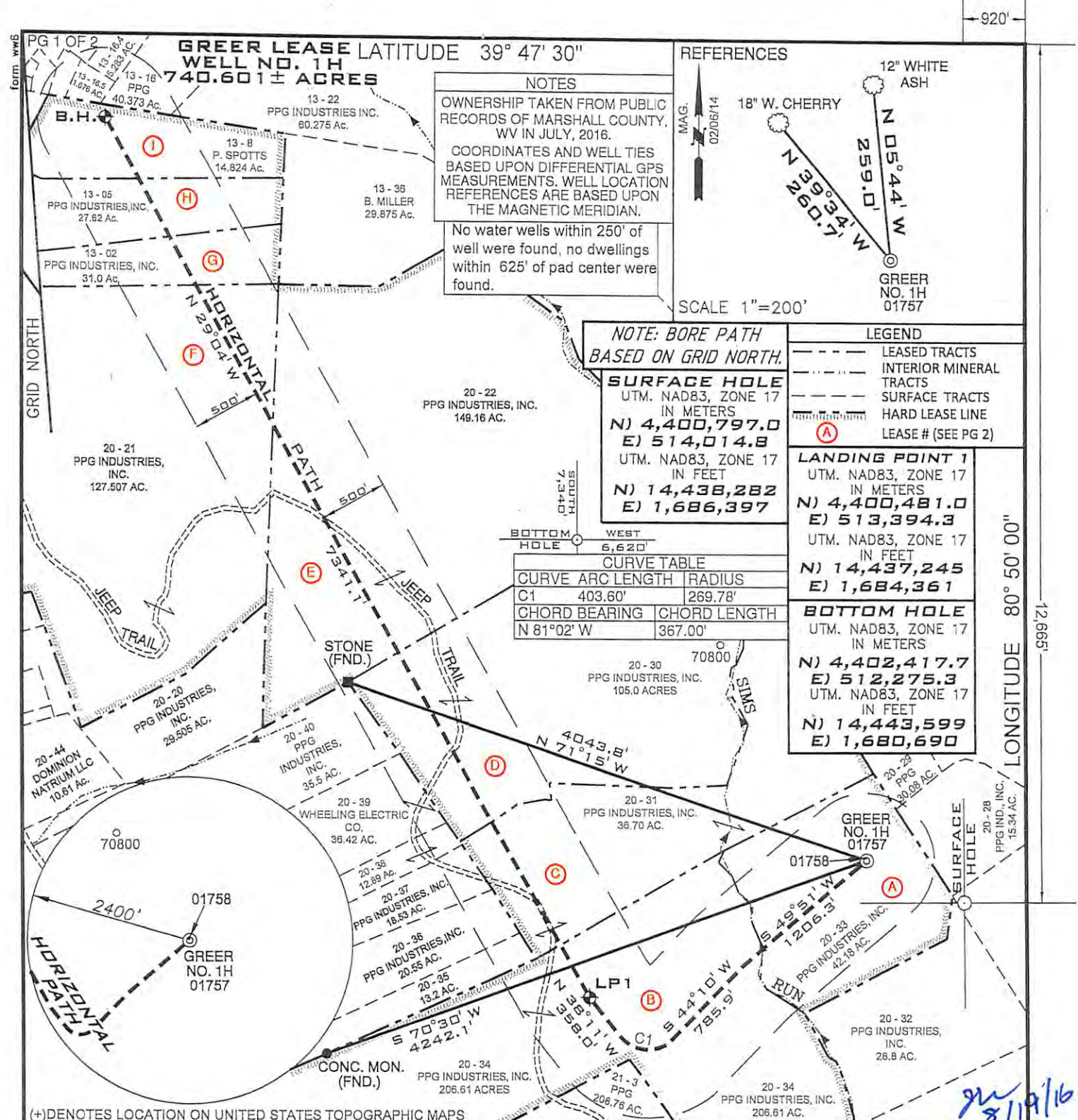
**GREER WELL NO. 1H
WELL PLAT LEASE INFORMATION**

Lease No.	Tag	Parcel	Oil & Gas Royalty Owner	Deed Book/Pg	
WV16-0076-001	A	5-20-33	PPG INDUSTRIES, INC.	725	123
WV16-0076-001	B	5-20-34	PPG INDUSTRIES, INC.	725	123
WV16-0076-001	C	5-20-31	PPG INDUSTRIES, INC.	725	123
WV16-0076-001	D	5-20-30	PPG INDUSTRIES, INC.	725	123
WV16-0076-068	D	5-20-30	DAN J. SWOVELAND	827	523
WV16-0076-069	D	5-20-30	CARRIE E METZGER FKA CARRIE ELIZABETH CHAMBERS	833	527
WV16-0076-070	D	5-20-30	CHRISTINA CHAMBERS	836	123
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WV16-0076-117	D	5-20-30	DAVID C WHITE, ESQ., SPECIAL COMMISSIONER ON BEHALF OF D.W. CHESSE OR HIS HEIRS, SUCCESSORS, ASSIGNS, DEVISEES, OR DISTRIBUTEES	872	217
WV16-0076-063	D	5-20-30	ALLEN D. MASON	827	276
WV16-0076-064	D	5-20-30	RODNEY K. CHAMBERS	827	271
WV16-0076-065	D	5-20-30	CAROLYN STARKEY	827	226
WV16-0076-066	D	5-20-30	CHRISTINA I. CHILCOTE	827	525
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WV16-0076-054	D	5-20-30	BRIAN K. MARMIE & CAROL L. MARMIE	805	76
WV16-0076-055	D	5-20-30	KARI B. MARMIE	809	515
WV16-0076-056	D	5-20-30	TRAVIS D. MARMIE	808	491
WV16-0076-057	D	5-20-30	DEWAYNE STARKEY	815	228
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WV16-0076-049	D	5-20-30	TERRY I. CHAMBERS	800	404
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WV16-0076-051	D	5-20-30	HOWARD A. BROWN	805	98
WV16-0076-052	D	5-20-30	RAE JEAN NAMETH	805	80
WV16-0076-041	D	5-20-30	JOANN FRAZIER	799	59
WV16-0076-042	D	5-20-30	JOSEPH CHAMBERS	799	450
WV16-0076-043	D	5-20-30	ROBERT MARMIE	799	455
WV16-0076-044	D	5-20-30	FLORENCE L. MYERS	799	457
WV16-0076-045	D	5-20-30	BARBARA METZNER	799	459
WV16-0076-046	D	5-20-30	LYNNETTE L. KUGLER	799	461
WV16-0076-012	D	5-20-30	COLLIN A. WILLISON III	789	577
WV16-0076-032	D	5-20-30	LETITIA TEMPLE	799	465
WV16-0076-037	D	5-20-30	MARY C. JOSEPH	797	196
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WV16-0142-000	I	5-13-8	PAUL F. SPOTTS	779	482

12/09/2016

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



FILE NUMBER W0120319 (WB1-76)
 DRAWING NUMBER GREER_WP_1H_REV1
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 PROVEN SOURCE OF ELEVATION SUBMETER MAPPING GRADE GPS

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P.S. 2122 Jonathan N. White



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 601 57TH STREET, SE
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MARCH 14, 2014
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SI-017 87 Mon

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