



west virginia department of environmental protection

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

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

March 1, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

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

FORT WORTH, TX 76107

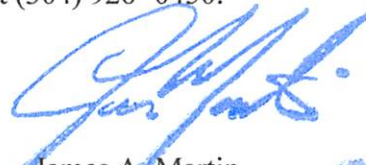
Re: Permit Modification Approval for HEAVEN HILL 3-4HM
47-051-01947-00-00

Modified Bottom Hole Coordinate thereby Shortening the Lateral

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: HEAVEN HILL 3-4HM
Farm Name: RICKY L. WHITLATCH
U.S. WELL NUMBER: 47-051-01947-00-00
Horizontal 6A / New Drill
Date Issued: March 1, 2018

Promoting a healthy environment.

03/02/2018

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 Meade Glen Easton 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Heaven Hill 3-4HM Well Pad Name: Heaven Hill 3

3) Farm Name/Surface Owner: Ricky L. Whitlatch Public Road Access: Yeater Land CR 21/11

4) Elevation, current ground: 1344' Elevation, proposed post-construction: 1326'

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

(b) If Gas Shallow Deep _____
Horizontal _____

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 6724 - 6776' thickness of 52' and anticipated pressure of approx. 3800 psi

8) Proposed Total Vertical Depth: 6,876'

9) Formation at Total Vertical Depth: Onondaga

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10) Proposed Total Measured Depth: 14,895'

FEB 6 2018

11) Proposed Horizontal Leg Length: 7,549'

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12) Approximate Fresh Water Strata Depths: 70', 1038'

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: 2,167'

15) Approximate Coal Seam Depths: Sewickly Coal - 946' and Pittsburgh Coal - 1031'

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: Marshall County Coal Co. / Marshall County Mine
Depth: 1031' TVD and 313' subsea level
Seam: Pittsburgh #8
Owner: Murray Energy / Consolidated Coal Co.

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	NEW	BW	BW	120'	120'	338FT^3(CTS)
Fresh Water	13 3/8"	NEW	H40	48#	1,120'	1,120'	1142ft^3(CTS)
Coal	13 3/8"	NEW	H40	48#	1,120'	1,120'	1142ft^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#	2,800'	2,800'	895ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	14,895'	14,895'	3363ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#		7,204'	
Liners							

JL
2/5/18

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	36"	1.0	2,333	1,866	CLASS A	1.2
Fresh Water	13 3/8"	17 1/2"	.33	1,730	1,384	SEE #24	1.2
Coal	13 3/8"	17 1/2"	.33	1,730	1,384	SEE#24	1.2
Intermediate	9 5/8"	12 1/4"	.352	3,520	2,816	SEE#24	1.19
Production	5 1/2"	8 7/8_8 3/4	.361	12,640	10,112	SEE#24	1.17/1.19
Tubing	2 3/8"		.19	11,200	8,960		
Liners							

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PACKERS

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

WW-6B
(10/14)

API NO. 47-051 - 01947MOD
OPERATOR WELL NO. Heaven Hill 3-4HM
Well Pad Name: Heaven Hill 3

J
2/5/18

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

Drill through the Marcellus and TD Pilot Hole 100' into the Onondaga. Log vertical section and run a solid cement plug back to proposed KOP. Drill curve and lateral per proposed well plan, run and cement production casing. Perform CBL from 60 deg to surface, make cleanout run, and stimulate.

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

Well to be completed with approximately 30,670,000 lb prop and approximately 474,181 bbl of water. Max rate = 80 bpm; max psi = 9,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 18.43

22) Area to be disturbed for well pad only, less access road (acres): 7.15

23) Describe centralizer placement for each casing string:

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

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

*See Attachment

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25) Proposed borehole conditioning procedures:

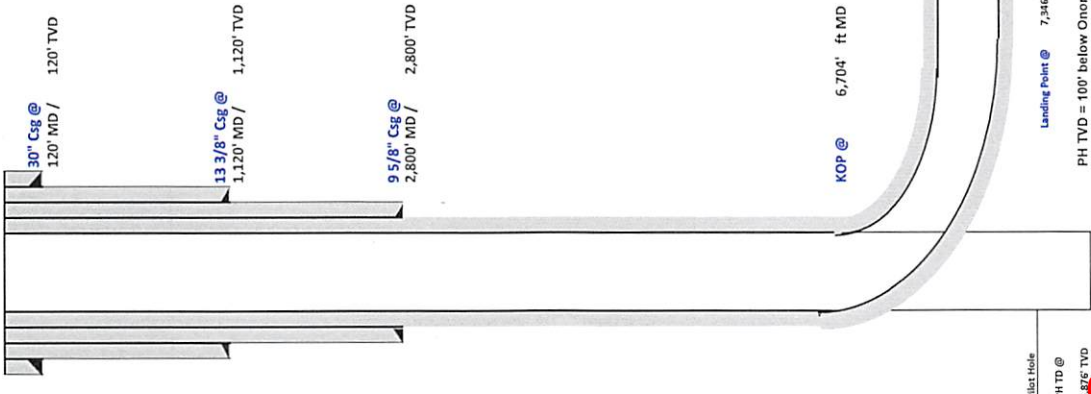
Will circulate a minimum of 3 hours at TD, short trip to curve, circulate bottoms up, check for flow, POOH

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*Note: Attach additional sheets as needed.



WELL NAME: Heaven Hill 3-4HM COUNTY: Marshall
 STATE: West Virginia DISTRICT: Meade
 DE Elev: 1,326' GL Elev: 1,326'
 TD: 14,895'
 TH Latitude: 39.80857655
 TH Longitude: -80.69319108
 BH Latitude: 39.78580809
 BH Longitude: -80.67661711



Formation	Depth TVD
Deepest Fresh Water	1038
Swickley Coal	946
Pittsburgh Coal	1031
Big Line	2060
Weir	2486
Berea	2684
Gordon	2946
Rhinestreet	6068
Genesee/fairkett	6586
Tully	6617
Hamilton	6650
Marcellus	6724
Landing Depth	6752
Onondaga	6776
Pilot Hole Depth	6876

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 3/8	1,120'	1,120'	48	H40	Surface
Intermediate 1	12 1/4	9 5/8	2,800'	2,800'	36	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	14,895'	6,884'	20	P110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
Sacks	Class	Density	Fluid Type	Centralizer	Notes
338	A	15.6	Air		None
1,142	A	15.6	Air		3 Centralizers at equal distance
895	A	15	Air		1 Centralizer every other jt
3,363	A	14.5	Air / SOBM		1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc

Handwritten: JWC 2/5/18

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Lateral TD @ 14,855' ft MD
 6,884' ft TVD

Landing Point @ 7,346 MD / 6,752 TVD
 PH TD @ 6,876 TVD
 PH TVD = 100' below Onondaga Top



Tug Hill Operating, LLC Casing and Cement Program

Heaven Hill 3-4HM

Casing

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	120'	CTS
Surface	13 3/8"	H40	17 1/2"	1,120'	CTS
Intermediate	9 5/8"	J55	12 1/4"	2,800'	CTS
Production	5 1/2"	P110	8 7/8 x 8 3/4"	14,895'	CTS

Cement

Conductor:	Premium NE-1 + 2% bwoc CaC12 + 46.5% Fresh Water – Conductor Cement mixed at 15.6 ppg, Y=1.2
Surface:	Premium NE-1 + 2% bwoc CaC12 + 46.5% Fresh Water – Surface Cement mixed at 15.6 ppg, Y=1.2
Intermediate:	Premium NE-1 + 1% bwoc CaC12 + 46.5% Fresh Water – Intermediate Cement mixed at 15.6 ppg, Y=1.19
Kick Off Plug:	Class H Cement + 1% CD-32 + .7% Sodium Metasilicate + .1% R-3 + .75 gal/100sk FP-13L - KOP Plug
Production:	50:50 Poz: Premium NE-1 + .1% bwoc ASA-301 + 60lb/sk ASCA-1 + .35% bwoc BA-10A + .25% bwoc MPA-170, 44 lb sack + .5% bwoc R-3 + .75 gals/100sk FP-13L – Production Cement mixed at 15.2ppg, Y = 1.19

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Well: Heaven Hill 3-4 HM
Site: Heaven Hill 3
Project: Marshall County, West Virginia
Design: rev4



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	VFace	VSect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1200.00	3.00	152.87	1349.93	-3.49	1.79	2.00	0.00	0.00	KOP Begin 2'100" build
3	1350.00	3.00	152.87	3000.00	-80.46	41.22	2.00	152.87	3.92	Begin 3.00° tangent
4	3002.33	3.00	152.87	4057.70	-314.56	161.18	2.00	0.00	90.32	Begin 2'100" build/turn
5	4098.94	24.93	152.87	6420.44	-1292.07	662.04	0.00	0.00	353.15	Begin 24.93° tangent
6	6704.49	24.93	150.00	6752.00	-1737.26	910.33	10.00	-3.19	1960.28	Begin 10'100" build/turn
7	7345.49	89.00	150.00	6884.00	-8274.26	4684.46	0.00	0.00	9508.29	Begin 89.00° lateral section
8	14894.92	89.00	150.00	6884.00	-8274.26	4684.46	0.00	0.00	9508.29	PBHLTD 14894.92 MD/6884.00 TVD



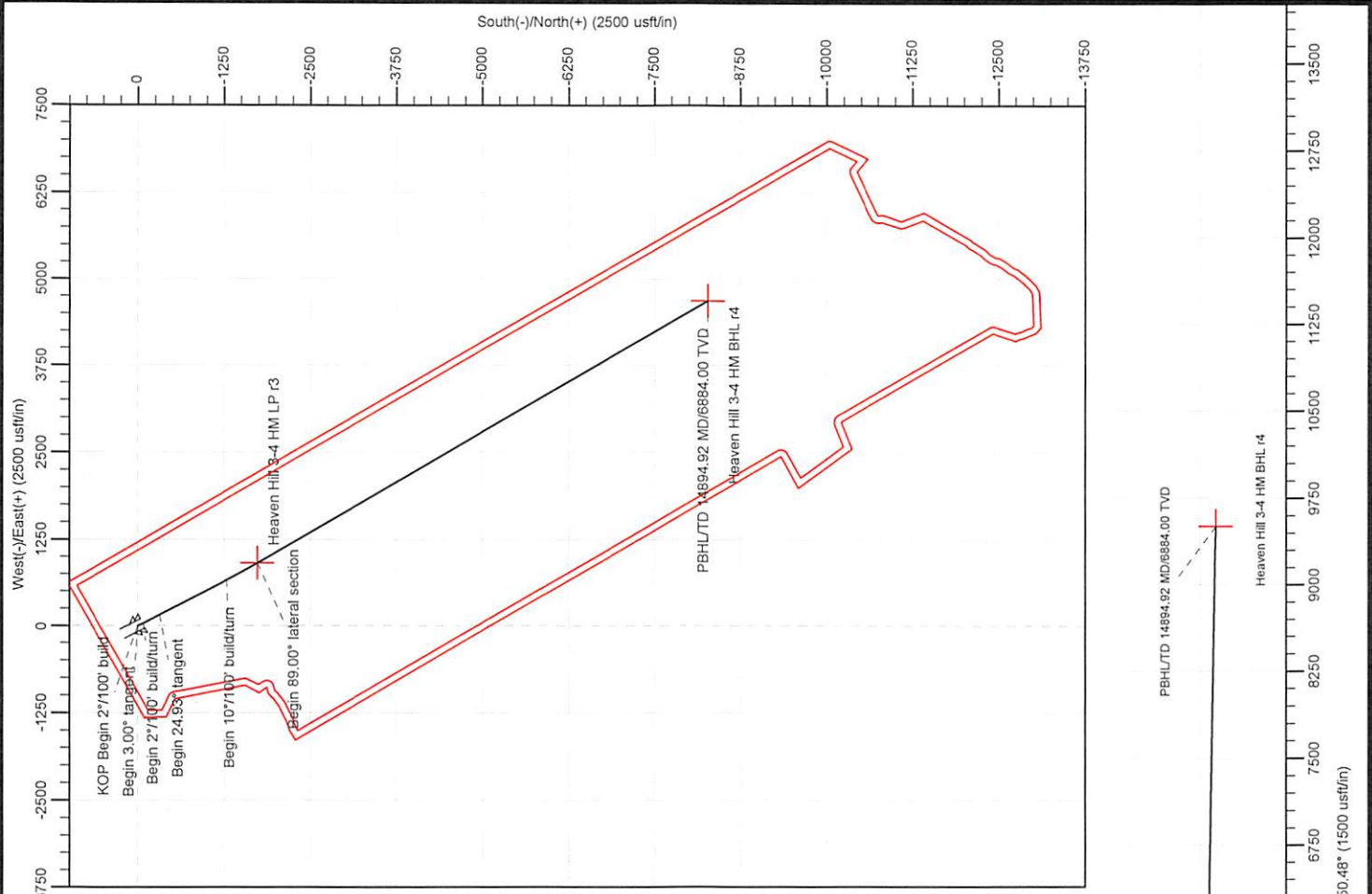
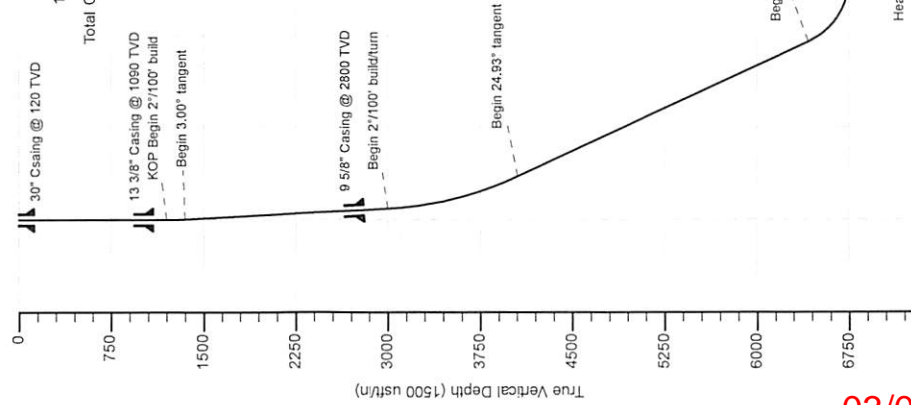
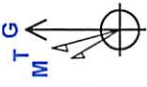
Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD83 West Virginia - HARR
 Ellipsoid: GRS 1990
 Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level
 Depth Reference: GL @ 1326.00usft

Northing: 14457177.31
 Easting: 1726576.31
 Latitude: 39.80857655
 Longitude: -80.69319108

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.89°

Azimuths to Grid North
 True North: -0.20°
 Magnetic North: -8.89°
 Magnetic Field Strength: 52225.1snT
 Dip Angle: 67.00°
 Date: 2/3/2017
 Model: IGRF2015



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Area of Review

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

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

Data Sources Reviewed:

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

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

Request maps for:

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

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


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

Permit well - Heaven Hill 3-4HM

Wells within 500' Buffer

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

API Number	Operator Name	Total Depth	Perforated Fms	Producing zones not perforated	Is this well "known or reasonably expected to penetrate a depth that could be within the range of Fracture propagation"? 1000' is max limit I would assign to wells that might be within in range of fracture propagation	Comments
4705101934	Tug Hill	6737' TVD planned	None	None	No, Permitted Marcellus well	Permitted Marcellus well. Not yet drilled
4705101962	Tug Hill	6737' TVD planned	None	None	No, Permitted Marcellus well	Permitted Marcellus well. Not yet drilled
4705101963	Tug Hill	6737' TVD planned	None	None	No, Permitted Marcellus well	Permitted Marcellus well. Not yet drilled
4705101948	Tug Hill	6737' TVD planned	None	None	No, Permitted Marcellus well	Permitted Marcellus well. Not yet drilled
4705170645	Unknown	Unknown	Unknown	Unknown	Unknown but unlikely, Probably an old shallow well	Old well, records are incomplete
4705100847	McElroy Coal Co.	Unknown	Unknown	Unknown	Unknown but unlikely, Appears to be a coal test bore well	Well records are incomplete, plug date 2/18/2000
4705100846	Hope Natural Gas Co.	Unknown	Unknown	Unknown	Unknown but unlikely, Appears to be a coal test bore well	Well records are incomplete, plug date 12/12/1999
4705100855	Hope Natural Gas Co.	Unknown	Unknown	Unknown	Unknown but unlikely, Appears to be a coal test bore well	Old well, records are incomplete, plug date 10/10/2000
4705100593	McElroy Coal Co.	2521	Gordon	Unknown	No. TVD depth of well is too shallow to be within Range of potential Fracture propagation from Marcellus wells	Plug date 2/20/2004
4705170160	Hope Natural Gas Co.	2470	Unknown, likely Gordon	Unknown	No. TVD depth of well is too shallow to be within Range of potential Fracture propagation from Marcellus wells	Well Records are incomplete



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[County Code Translations](#)
[Permit Number Search](#)
[Usage Notes](#)
[Contact Information](#)
[WVGES Main](#)
[Pipeline Plug New](#)

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

Enter Permit #: 70645

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

Get Data Reset

WV Geological & Economic Survey: **Well: County = 51 Permit = 70645** Report Time: Thu

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4705170445	Marshall	70645	Meade	Glenn Easton	Cameron	39.954238	-80.651104	629442.5	4458075.5

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_V
4705170445				unknown	Prity Map	E.J Jones		1575		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
4705170445							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

51-01947
MOD

WGES
"Pipeline"

Select County: (051) Marshall
Enter Permit #: 00847
Get Data Reset

Select datatypes: (Check All)
 Location Production Plugging
 Owner/Completion Stratigraphy Sample
 Pay/Show/Water Logs Bm Hole Loc

Table Descriptions
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[Contact Information](#)
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[WGES Main](#)
[Pipeline Plug New](#)

WV Geological & Economic Survey: Well: County = 51 Permit = 00847 Report Time: Thursday, June 03, 2010

Well Reassignment Information: Reassigned From
 OLD_COUNTY OLD_PERMIT NEW_COUNTY NEW_PERMIT
 51 70954 51 847

Location Information: [View Map](#)
 API COUNTY PERMIT TAX_DISTRICT QUAD_75 QUAD_15 LAT_DD LON_DD UTMN UTMN
 4725102847 Marshall 847 Meade Glen Easton Cameron 30.70014 -80.63734 520705.4 4405469.8

There is no Bottom Hole Location data for this well

Owner Information:
 API CMP_DT SUFFIX STATUS SURFACE_OWNER WELL_NUM CO_NUM LEASE LEASE_NUM MINERAL_OWN OPERATOR_AT_COMPLETION PROF_V
 4725102847 2/19/2000 Plugging Completed Larry J Whetzel m-49 McElroy Coal Company
 4725102847 unknown Prop Map E J Jones 1120 Manufacturers Light & Heat Co

Completion Information:
 API CMP_DT SPUD_DT ELEV DATUM FIELD DEEPEST_FM DEEPEST_FMT INITIAL_CLASS FINAL_CLASS TYPE RIG CMP_MTHD TVD
 4725102847 2/19/2000 2/6/2000 unclassified unclassified not available unknown unknown
 4725102847 unknown unknown 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

Plugging Information:
 API PLO_DT DEPTH_PBT
 4725102847 2/19/2000 0

There is no Sample data for this well

WGES
"Pipeline"

Select County: (051) Marshall
Enter Permit #: 00846
Get Data Reset

Select datatypes: (Check All)
 Location Production Plugging
 Owner/Completion Stratigraphy Sample
 Pay/Show/Water Logs Bm Hole Loc

Table Descriptions
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[Pipeline Plug New](#)

WV Geological & Economic Survey: Well: County = 51 Permit = 00846 Report Time: Thursday, June 03, 2010

Well Reassignment Information: Reassigned From
 OLD_COUNTY OLD_PERMIT NEW_COUNTY NEW_PERMIT
 51 70855 51 846

Location Information: [View Map](#)
 API COUNTY PERMIT TAX_DISTRICT QUAD_75 QUAD_15 LAT_DD LON_DD UTMN UTMN
 4725102846 Marshall 846 Meade Glen Easton Cameron 30.73782 -80.63435 527024.4 4405369.0

There is no Bottom Hole Location data for this well

Owner Information:
 API CMP_DT SUFFIX STATUS SURFACE_OWNER WELL_NUM CO_NUM LEASE LEASE_NUM MINERAL_OWN OPERATOR_AT_COMPLETION PROF_V
 4725102846 12/12/1999 Plugging Completed Alice Wain M-83 Consolidation Coal Co
 4725102846 unknown Prop Map E Garby 590 Hope Natural Gas Company

Completion Information:
 API CMP_DT SPUD_DT ELEV DATUM FIELD DEEPEST_FM DEEPEST_FMT INITIAL_CLASS FINAL_CLASS TYPE RIG CMP_MTHD TVD IMD
 4725102846 12/12/1999 12/3/1999 1252 Ground Level unclassified unclassified not available unknown unknown
 4725102846 unknown unknown 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

Plugging Information:
 API PLO_DT DEPTH_PBT
 4725102846 12/12/1999 0

There is no Sample data for this well

WGES
"Pipeline"

Select County: (051) Marshall
Enter Permit #: 00855
Get Data Reset

Select datatypes: (Check All)
 Location Production Plugging
 Owner/Completion Stratigraphy Sample
 Pay/Show/Water Logs Bm Hole Loc

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[Permit Numbering Series](#)
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[Pipeline Plug New](#)

WV Geological & Economic Survey: Well: County = 51 Permit = 00855 Report Time: Thursday, June 03, 2010

Well Reassignment Information: Reassigned From
 OLD_COUNTY OLD_PERMIT NEW_COUNTY NEW_PERMIT
 51 70780 51 855

Location Information: [View Map](#)
 API COUNTY PERMIT TAX_DISTRICT QUAD_75 QUAD_15 LAT_DD LON_DD UTMN UTMN
 4725102855 Marshall 855 Meade Glen Easton Cameron 30.700439 -80.630702 527333.2 4404547.2

There is no Bottom Hole Location data for this well

Owner Information:
 API CMP_DT SUFFIX STATUS SURFACE_OWNER WELL_NUM CO_NUM LEASE LEASE_NUM MINERAL_OWN OPERATOR_AT_COMPLETION PROF_V
 4725102855 10/10/2000 Plugging Completed K N & D R McCardie M-85 Consolidation Coal Co
 4725102855 unknown Prop Map Samuel Riggs 571 Hope Natural Gas Company

Completion Information:
 API CMP_DT SPUD_DT ELEV DATUM FIELD DEEPEST_FM DEEPEST_FMT INITIAL_CLASS FINAL_CLASS TYPE RIG CMP_MTHD TVD TMD
 4725102855 10/10/2000 6/14/2000 1259 Ground Level unclassified unclassified not available unknown unknown
 4725102855 unknown unknown 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

Plugging Information:
 API PLO_DT DEPTH_PBT
 4725102855 10/10/2000 0

There is no Sample data for this well

51-01947MOB

WVGES
"Pipeline"

Select County: (051) Marshall
Enter Permit #: 00593
Get Data Reset

Select datatypes: (Check All)
 Location
 Production
 Plugging
 Owner/Completion
 Stratigraphy
 Sample
 Pay>ShowWater
 Logs
 Btm Hole Loc

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WV Geological & Economic Survey
Well: County = 51 Permit = 00593 Report Time: Thursday, June 08, 2017 1:37:32 PM

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_OD	LON_OD	UTME	UTMN
4705100593	Marshall	593	Meade	Olan Easton	Cameron	39.75035	-80.678127	527050.5	4404027.4

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_AT_COMPLETION	PROP_VD
4705100593	11/3/1914		Original Loc	Completed	David Dowdell et al	1	1227			Manufacturers Light & Heat Co.	
4705100593	2/20/2004		Plugging	Completed	Harmon & Mary E Crow		51-78			McElroy Coal Company	

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TY
4705100593	11/3/1914				Cameron-Garner	Greenland Gap Fm	Gordon	unclassified	unclassified	Gas	unknown	unknown	2521	
4705100593	2/20/2004	2/1/2004	720	Ground Level										

There is no Pay data for this well

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

Plugging Information:

API	PLG_DT	DEPTH_FBT
4705100593	2/20/2004	0

There is no Sample data for this well

WVGES
"Pipeline"

Select County: (051) Marshall
Enter Permit #: 70160
Get Data Reset

Select datatypes: (Check All)
 Location
 Production
 Plugging
 Owner/Completion
 Stratigraphy
 Sample
 Pay>ShowWater
 Logs
 Btm Hole Loc

[Table Descriptions](#)
[County Code Translations](#)
[Permit Numbering Schemas](#)
[Usage Notes](#)
[Contact Information](#)
[Disclaimer](#)
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[Feedback/Help/News](#)

WV Geological & Economic Survey
Well: County = 51 Permit = 70160 Report Time: Thursday, June 08, 2017 2:1

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_OD	LON_OD	UTME	UTMN
4705170160	Marshall	70160	Meade	Olan Easton	Cameron	39.75009	-80.678811	527873.3	4404058.7

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM
4705170160			Original Loc	Completed	John W West	1	M-45			Wheeler Natural Gas Co. The		

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_FTO	G_BEF
4705170160					Bacromer	Gordon (undfr)		unclassified	unclassified	net available	unknown	unknown	2470		2470	

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

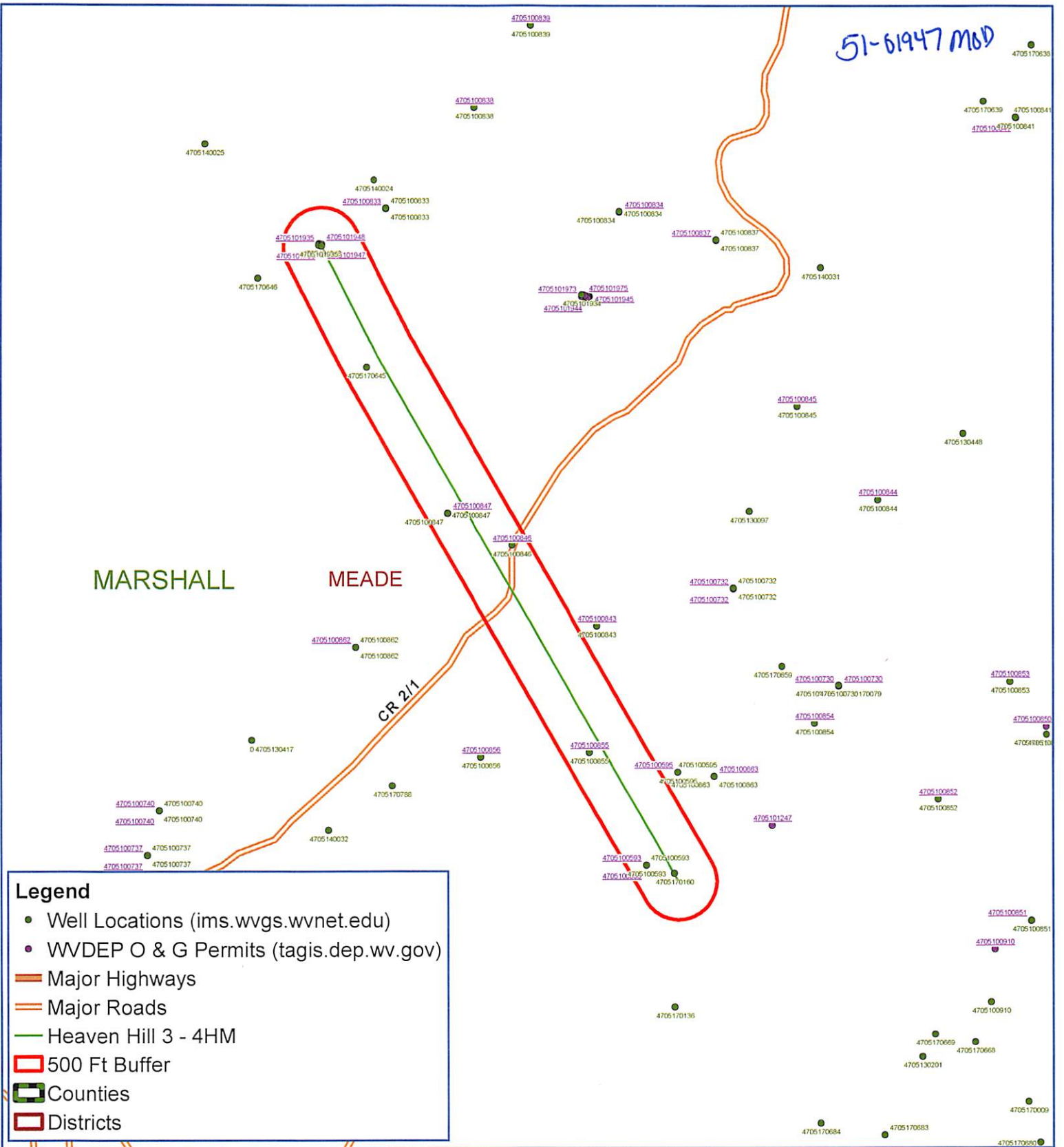
There is no Production NGL data for this well ** some operators may have reported NGL under Oil

There is no Stratigraphy data for this well

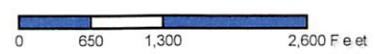
There is no Wireline (E-Log) data for this well

There is no Plugging data for this well

There is no Sample data for this well



Heaven Hill 3-4HM Meade District Marshall County, WV



Map Prepared by:

 03/02/2018

Map Created: February 2, 2018
 Map Current As Of: February 2, 2018

Notes:
 All locations are approximate and are for visualization purposes only.



Well Site Safety Plan

Tug Hill Operating, LLC

JW
2/5/18

Well Name: Heaven Hill 3-4HM

Pad Location: Heaven Hill 3

Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:

Northing-4,406,556.46

Easting -526,262.12

February 2018



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 3-4 HM
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1326.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1326.00usft
Site:	Heaven Hill 3	North Reference:	Grid
Well:	Heaven Hill 3-4 HM	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

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

Site	Heaven Hill 3				
Site Position:		Northing:	14,457,178.77 usft	Latitude:	39.80858060
From:	Lat/Long	Easting:	1,726,571.98 usft	Longitude:	-80.69321360
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.20 °

Well	Heaven Hill 3-4 HM					
Well Position	+N/-S	0.00 usft	Northing:	14,457,177.31 usft	Latitude:	39.80857655
	+E/-W	0.00 usft	Easting:	1,726,578.31 usft	Longitude:	-80.69319108
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	1,326.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	2/3/2017	-8.69	67.00	52,225.05940637

Design	rev4			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	150.48

Plan Survey Tool Program	Date	2/2/2018			
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks	
1	0.00	14,894.92 rev4 (Original Hole)	MWD MWD - Standard		

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Plan Sections											
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00		
1,350.00	3.00	152.87	1,349.93	-3.49	1.79	2.00	2.00	0.00	152.87		
3,002.33	3.00	152.87	3,000.00	-80.46	41.22	0.00	0.00	0.00	0.00		
4,098.94	24.93	152.87	4,057.70	-314.56	161.18	2.00	2.00	0.00	0.00		
6,704.49	24.93	152.87	6,420.44	-1,292.07	662.04	0.00	0.00	0.00	0.00		
7,345.49	89.00	150.00	6,752.00	-1,737.26	910.33	10.00	9.99	-0.45	-3.19	Heaven Hill 3-4 HM L	
14,894.92	89.00	150.00	6,884.00	-8,274.26	4,684.46	0.00	0.00	0.00	0.00	Heaven Hill 3-4 HM B	

SI-01947mod



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 3-4 HM
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1326.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1326.00usft
Site:	Heaven Hill 3	North Reference:	Grid
Well:	Heaven Hill 3-4 HM	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

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FEB 6 2018
WV Department of
Environmental Protection

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	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
100.00	0.00	0.00	100.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
200.00	0.00	0.00	200.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
300.00	0.00	0.00	300.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
400.00	0.00	0.00	400.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
500.00	0.00	0.00	500.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
600.00	0.00	0.00	600.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
700.00	0.00	0.00	700.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
800.00	0.00	0.00	800.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
900.00	0.00	0.00	900.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108
KOP Begin 2°/100' build									
1,300.00	2.00	152.87	1,299.98	-1.55	0.80	14,457,175.76	1,726,579.11	39.80857228	-80.69318827
1,350.00	3.00	152.87	1,349.93	-3.49	1.79	14,457,173.82	1,726,580.10	39.80856694	-80.69318475
Begin 3.00° tangent									
1,400.00	3.00	152.87	1,399.86	-5.82	2.98	14,457,171.49	1,726,581.30	39.80856053	-80.69318053
1,500.00	3.00	152.87	1,499.73	-10.48	5.37	14,457,166.83	1,726,583.68	39.80854772	-80.69317209
1,600.00	3.00	152.87	1,599.59	-15.14	7.76	14,457,162.17	1,726,586.07	39.80853490	-80.69316364
1,700.00	3.00	152.87	1,699.45	-19.80	10.14	14,457,157.52	1,726,588.46	39.80852209	-80.69315520
1,800.00	3.00	152.87	1,799.31	-24.45	12.53	14,457,152.86	1,726,590.84	39.80850928	-80.69314676
1,900.00	3.00	152.87	1,899.18	-29.11	14.92	14,457,148.20	1,726,593.23	39.80849646	-80.69313832
2,000.00	3.00	152.87	1,999.04	-33.77	17.30	14,457,143.54	1,726,595.62	39.80848365	-80.69312988
2,100.00	3.00	152.87	2,098.90	-38.43	19.69	14,457,138.89	1,726,598.00	39.80847084	-80.69312144
2,200.00	3.00	152.87	2,198.77	-43.09	22.08	14,457,134.23	1,726,600.39	39.80845802	-80.69311300
2,300.00	3.00	152.87	2,298.63	-47.74	24.46	14,457,129.57	1,726,602.78	39.80844521	-80.69310456
2,400.00	3.00	152.87	2,398.49	-52.40	26.85	14,457,124.91	1,726,605.16	39.80843239	-80.69309611
2,500.00	3.00	152.87	2,498.36	-57.06	29.24	14,457,120.25	1,726,607.55	39.80841958	-80.69308767
2,600.00	3.00	152.87	2,598.22	-61.72	31.62	14,457,115.60	1,726,609.94	39.80840677	-80.69307923
2,700.00	3.00	152.87	2,698.08	-66.37	34.01	14,457,110.94	1,726,612.32	39.80839395	-80.69307079
2,800.00	3.00	152.87	2,797.94	-71.03	36.40	14,457,106.28	1,726,614.71	39.80838114	-80.69306235
2,900.00	3.00	152.87	2,897.81	-75.69	38.78	14,457,101.62	1,726,617.09	39.80836832	-80.69305391
3,000.00	3.00	152.87	2,997.67	-80.35	41.17	14,457,096.97	1,726,619.48	39.80835551	-80.69304547
3,002.33	3.00	152.87	3,000.00	-80.46	41.22	14,457,096.86	1,726,619.54	39.80835521	-80.69304527
Begin 2°/100' build/turn									
3,100.00	4.95	152.87	3,097.43	-86.48	44.31	14,457,090.83	1,726,622.63	39.80833863	-80.69303435
3,200.00	6.95	152.87	3,196.88	-95.71	49.04	14,457,081.60	1,726,627.36	39.80831324	-80.69301762
3,300.00	8.95	152.87	3,295.92	-108.03	55.35	14,457,069.29	1,726,633.66	39.80827936	-80.69299530
3,400.00	10.95	152.87	3,394.41	-123.41	63.23	14,457,053.90	1,726,641.55	39.80823704	-80.69296743
3,500.00	12.95	152.87	3,492.23	-141.84	72.68	14,457,035.47	1,726,650.99	39.80818634	-80.69293402
3,600.00	14.95	152.87	3,589.28	-163.30	83.67	14,457,014.01	1,726,661.99	39.80812730	-80.69289513
3,700.00	16.95	152.87	3,685.42	-187.76	96.21	14,456,989.55	1,726,674.52	39.80806001	-80.69285080
3,800.00	18.95	152.87	3,780.55	-215.19	110.26	14,456,962.12	1,726,688.57	39.80798454	-80.69280109
3,900.00	20.95	152.87	3,874.54	-245.56	125.82	14,456,931.75	1,726,704.14	39.80790100	-80.69274605
4,000.00	22.95	152.87	3,967.28	-278.83	142.87	14,456,898.48	1,726,721.18	39.80780947	-80.69268576
4,098.93	24.93	152.87	4,057.69	-314.56	161.18	14,456,862.76	1,726,739.49	39.80771118	-80.69262101
Begin 24.93° tangent									
4,098.94	24.93	152.87	4,057.70	-314.56	161.18	14,456,862.75	1,726,739.49	39.80771117	-80.69262100
4,100.00	24.93	152.87	4,058.67	-314.96	161.38	14,456,862.35	1,726,739.70	39.80771007	-80.69262028
4,200.00	24.93	152.87	4,149.35	-352.48	180.61	14,456,824.84	1,726,758.92	39.80760686	-80.69255229
4,300.00	24.93	152.87	4,240.03	-389.99	199.83	14,456,787.32	1,726,778.14	39.80750365	-80.69248430
4,400.00	24.93	152.87	4,330.71	-427.51	219.05	14,456,749.80	1,726,797.36	39.80740044	-80.69241631
4,500.00	24.93	152.87	4,421.39	-465.03	238.27	14,456,712.29	1,726,816.59	39.80729723	-80.69234832



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 3-4 HM
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1326.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1326.00usft
Site:	Heaven Hill 3	North Reference:	Grid
Well:	Heaven Hill 3-4 HM	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

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Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,600.00	24.93	152.87	4,512.07	-502.54	257.50	14,456,674.77	1,726,835.81	39.80719402	-80.69228033
4,700.00	24.93	152.87	4,602.75	-540.06	276.72	14,456,637.25	1,726,855.03	39.80709081	-80.69221235
4,800.00	24.93	152.87	4,693.43	-577.57	295.94	14,456,599.74	1,726,874.26	39.80698760	-80.69214436
4,900.00	24.93	152.87	4,784.11	-615.09	315.17	14,456,562.22	1,726,893.48	39.80688439	-80.69207637
5,000.00	24.93	152.87	4,874.79	-652.61	334.39	14,456,524.71	1,726,912.70	39.80678118	-80.69200838
5,100.00	24.93	152.87	4,965.47	-690.12	353.61	14,456,487.19	1,726,931.93	39.80667797	-80.69194039
5,200.00	24.93	152.87	5,056.15	-727.64	372.84	14,456,449.67	1,726,951.15	39.80657476	-80.69187241
5,300.00	24.93	152.87	5,146.84	-765.16	392.06	14,456,412.16	1,726,970.37	39.80647155	-80.69180442
5,400.00	24.93	152.87	5,237.52	-802.67	411.28	14,456,374.64	1,726,989.59	39.80636834	-80.69173643
5,500.00	24.93	152.87	5,328.20	-840.19	430.50	14,456,337.12	1,727,008.82	39.80626513	-80.69166845
5,600.00	24.93	152.87	5,418.88	-877.70	449.73	14,456,299.61	1,727,028.04	39.80616191	-80.69160046
5,700.00	24.93	152.87	5,509.56	-915.22	468.95	14,456,262.09	1,727,047.26	39.80605870	-80.69153247
5,800.00	24.93	152.87	5,600.24	-952.74	488.17	14,456,224.58	1,727,066.49	39.80595549	-80.69146449
5,900.00	24.93	152.87	5,690.92	-990.25	507.40	14,456,187.06	1,727,085.71	39.80585228	-80.69139650
6,000.00	24.93	152.87	5,781.60	-1,027.77	526.62	14,456,149.54	1,727,104.93	39.80574907	-80.69132851
6,100.00	24.93	152.87	5,872.28	-1,065.29	545.84	14,456,112.03	1,727,124.16	39.80564586	-80.69126053
6,200.00	24.93	152.87	5,962.96	-1,102.80	565.07	14,456,074.51	1,727,143.38	39.80554265	-80.69119254
6,300.00	24.93	152.87	6,053.64	-1,140.32	584.29	14,456,036.99	1,727,162.60	39.80543944	-80.69112456
6,400.00	24.93	152.87	6,144.32	-1,177.83	603.51	14,455,999.48	1,727,181.82	39.80533623	-80.69105657
6,500.00	24.93	152.87	6,235.01	-1,215.35	622.73	14,455,961.96	1,727,201.05	39.80523302	-80.69098859
6,600.00	24.93	152.87	6,325.69	-1,252.87	641.96	14,455,924.45	1,727,220.27	39.80512981	-80.69092060
6,700.00	24.93	152.87	6,416.37	-1,290.38	661.18	14,455,886.93	1,727,239.49	39.80502659	-80.69085262
6,704.48	24.93	152.87	6,420.43	-1,292.07	662.04	14,455,885.25	1,727,240.36	39.80502197	-80.69084957
Begin 10°/100' build/turn									
6,704.49	24.93	152.87	6,420.44	-1,292.07	662.04	14,455,885.24	1,727,240.36	39.80502196	-80.69084956
6,800.00	34.47	151.94	6,503.30	-1,333.93	683.99	14,455,843.38	1,727,262.30	39.80490678	-80.69077194
6,900.00	44.47	151.35	6,580.40	-1,389.78	714.18	14,455,787.53	1,727,292.49	39.80475312	-80.69066514
7,000.00	54.46	150.94	6,645.32	-1,456.25	750.83	14,455,721.07	1,727,329.14	39.80457024	-80.69053546
7,100.00	64.46	150.62	6,696.07	-1,531.31	792.83	14,455,646.00	1,727,371.14	39.80436370	-80.69038683
7,200.00	74.45	150.35	6,731.12	-1,612.69	838.91	14,455,564.62	1,727,417.22	39.80413977	-80.69022376
7,300.00	84.45	150.11	6,749.40	-1,697.92	887.67	14,455,479.40	1,727,465.98	39.80390526	-80.69005121
7,345.49	89.00	150.00	6,752.00	-1,737.26	910.33	14,455,440.06	1,727,488.64	39.80379700	-80.68997100
7,345.50	89.00	150.00	6,752.00	-1,737.26	910.33	14,455,440.05	1,727,488.65	39.80379699	-80.68997099
Begin 89.00° lateral section									
7,400.00	89.00	150.00	6,752.95	-1,784.46	937.58	14,455,392.86	1,727,515.89	39.80366712	-80.68987455
7,500.00	89.00	150.00	6,754.70	-1,871.05	987.57	14,455,306.27	1,727,565.89	39.80342885	-80.68969762
7,600.00	89.00	150.00	6,756.45	-1,957.64	1,037.57	14,455,219.68	1,727,615.88	39.80319057	-80.68952069
7,700.00	89.00	150.00	6,758.20	-2,044.23	1,087.56	14,455,133.09	1,727,665.87	39.80295230	-80.68934376
7,800.00	89.00	150.00	6,759.95	-2,130.82	1,137.55	14,455,046.50	1,727,715.86	39.80271403	-80.68916684
7,900.00	89.00	150.00	6,761.70	-2,217.40	1,187.54	14,454,959.91	1,727,765.86	39.80247576	-80.68898991
8,000.00	89.00	150.00	6,763.44	-2,303.99	1,237.54	14,454,873.32	1,727,815.85	39.80223748	-80.68881299
8,100.00	89.00	150.00	6,765.19	-2,390.58	1,287.53	14,454,786.73	1,727,865.84	39.80199921	-80.68863606
8,200.00	89.00	150.00	6,766.94	-2,477.17	1,337.52	14,454,700.14	1,727,915.83	39.80176094	-80.68845914
8,300.00	89.00	150.00	6,768.69	-2,563.76	1,387.51	14,454,613.55	1,727,965.82	39.80152266	-80.68828222
8,400.00	89.00	150.00	6,770.44	-2,650.35	1,437.50	14,454,526.96	1,728,015.82	39.80128439	-80.68810530
8,500.00	89.00	150.00	6,772.19	-2,736.94	1,487.50	14,454,440.37	1,728,065.81	39.80104611	-80.68792838
8,600.00	89.00	150.00	6,773.93	-2,823.53	1,537.49	14,454,353.78	1,728,115.80	39.80080784	-80.68775146
8,700.00	89.00	150.00	6,775.68	-2,910.12	1,587.48	14,454,267.19	1,728,165.79	39.80056956	-80.68757455
8,800.00	89.00	150.00	6,777.43	-2,996.71	1,637.47	14,454,180.60	1,728,215.79	39.80033129	-80.68739763
8,900.00	89.00	150.00	6,779.18	-3,083.30	1,687.46	14,454,094.01	1,728,265.78	39.80009301	-80.68722072
9,000.00	89.00	150.00	6,780.93	-3,169.89	1,737.46	14,454,007.42	1,728,315.77	39.79985474	-80.68704381
9,100.00	89.00	150.00	6,782.68	-3,256.48	1,787.45	14,453,920.84	1,728,365.76	39.79961646	-80.68686690
9,200.00	89.00	150.00	6,784.43	-3,343.07	1,837.44	14,453,834.25	1,728,415.75	39.79937819	-80.68668999
9,300.00	89.00	150.00	6,786.17	-3,429.66	1,887.43	14,453,747.66	1,728,465.75	39.79913991	-80.68651308



Planning Report - Geographic

Database: DB_Jul2216dt_v14
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia
 Site: Heaven Hill 3
 Well: Heaven Hill 3-4 HM
 Wellbore: Original Hole
 Design: rev4

Local Co-ordinate Reference: Well Heaven Hill 3-4 HM
 TVD Reference: GL @ 1326.00usft
 MD Reference: GL @ 1326.00usft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

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Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
9,400.00	89.00	150.00	6,787.92	-3,516.25	1,937.43	14,453,661.07	1,728,515.74	39.79890163	-80.68633617	
9,500.00	89.00	150.00	6,789.67	-3,602.84	1,987.42	14,453,574.48	1,728,565.73	39.79866335	-80.68615926	
9,600.00	89.00	150.00	6,791.42	-3,689.42	2,037.41	14,453,487.89	1,728,615.72	39.79842508	-80.68598236	
9,700.00	89.00	150.00	6,793.17	-3,776.01	2,087.40	14,453,401.30	1,728,665.72	39.79818680	-80.68580545	
9,800.00	89.00	150.00	6,794.92	-3,862.60	2,137.39	14,453,314.71	1,728,715.71	39.79794852	-80.68562855	
9,900.00	89.00	150.00	6,796.67	-3,949.19	2,187.39	14,453,228.12	1,728,765.70	39.79771024	-80.68545165	
10,000.00	89.00	150.00	6,798.41	-4,035.78	2,237.38	14,453,141.53	1,728,815.69	39.79747196	-80.68527475	
10,100.00	89.00	150.00	6,800.16	-4,122.37	2,287.37	14,453,054.94	1,728,865.68	39.79723369	-80.68509785	
10,200.00	89.00	150.00	6,801.91	-4,208.96	2,337.36	14,452,968.35	1,728,915.68	39.79699541	-80.68492095	
10,300.00	89.00	150.00	6,803.66	-4,295.55	2,387.36	14,452,881.76	1,728,965.67	39.79675713	-80.68474405	
10,400.00	89.00	150.00	6,805.41	-4,382.14	2,437.35	14,452,795.17	1,729,015.66	39.79651885	-80.68456716	
10,500.00	89.00	150.00	6,807.16	-4,468.73	2,487.34	14,452,708.58	1,729,065.65	39.79628057	-80.68439026	
10,600.00	89.00	150.00	6,808.90	-4,555.32	2,537.33	14,452,621.99	1,729,115.64	39.79604229	-80.68421337	
10,700.00	89.00	150.00	6,810.65	-4,641.91	2,587.32	14,452,535.40	1,729,165.64	39.79580401	-80.68403648	
10,800.00	89.00	150.00	6,812.40	-4,728.50	2,637.32	14,452,448.82	1,729,215.63	39.79556573	-80.68385959	
10,900.00	89.00	150.00	6,814.15	-4,815.09	2,687.31	14,452,362.23	1,729,265.62	39.79532745	-80.68368270	
11,000.00	89.00	150.00	6,815.90	-4,901.68	2,737.30	14,452,275.64	1,729,315.61	39.79508916	-80.68350581	
11,100.00	89.00	150.00	6,817.65	-4,988.27	2,787.29	14,452,189.05	1,729,365.61	39.79485088	-80.68332892	
11,200.00	89.00	150.00	6,819.40	-5,074.86	2,837.29	14,452,102.46	1,729,415.60	39.79461260	-80.68315204	
11,300.00	89.00	150.00	6,821.14	-5,161.44	2,887.28	14,452,015.87	1,729,465.59	39.79437432	-80.68297515	
11,400.00	89.00	150.00	6,822.89	-5,248.03	2,937.27	14,451,929.28	1,729,515.58	39.79413604	-80.68279827	
11,500.00	89.00	150.00	6,824.64	-5,334.62	2,987.26	14,451,842.69	1,729,565.57	39.79389775	-80.68262139	
11,600.00	89.00	150.00	6,826.39	-5,421.21	3,037.25	14,451,756.10	1,729,615.57	39.79365947	-80.68244451	
11,700.00	89.00	150.00	6,828.14	-5,507.80	3,087.25	14,451,669.51	1,729,665.56	39.79342119	-80.68226763	
11,800.00	89.00	150.00	6,829.89	-5,594.39	3,137.24	14,451,582.92	1,729,715.55	39.79318290	-80.68209075	
11,900.00	89.00	150.00	6,831.63	-5,680.98	3,187.23	14,451,496.33	1,729,765.54	39.79294462	-80.68191387	
12,000.00	89.00	150.00	6,833.38	-5,767.57	3,237.22	14,451,409.74	1,729,815.54	39.79270634	-80.68173700	
12,100.00	89.00	150.00	6,835.13	-5,854.16	3,287.21	14,451,323.15	1,729,865.53	39.79246805	-80.68156012	
12,200.00	89.00	150.00	6,836.88	-5,940.75	3,337.21	14,451,236.56	1,729,915.52	39.79222977	-80.68138325	
12,300.00	89.00	150.00	6,838.63	-6,027.34	3,387.20	14,451,149.97	1,729,965.51	39.79199148	-80.68120638	
12,400.00	89.00	150.00	6,840.38	-6,113.93	3,437.19	14,451,063.39	1,730,015.50	39.79175320	-80.68102950	
12,500.00	89.00	150.00	6,842.13	-6,200.52	3,487.18	14,450,976.80	1,730,065.50	39.79151491	-80.68085263	
12,600.00	89.00	150.00	6,843.87	-6,287.11	3,537.18	14,450,890.21	1,730,115.49	39.79127663	-80.68067577	
12,700.00	89.00	150.00	6,845.62	-6,373.70	3,587.17	14,450,803.62	1,730,165.48	39.79103834	-80.68049890	
12,800.00	89.00	150.00	6,847.37	-6,460.29	3,637.16	14,450,717.03	1,730,215.47	39.79080005	-80.68032203	
12,900.00	89.00	150.00	6,849.12	-6,546.87	3,687.15	14,450,630.44	1,730,265.47	39.79056177	-80.68014517	
13,000.00	89.00	150.00	6,850.87	-6,633.46	3,737.14	14,450,543.85	1,730,315.46	39.79032348	-80.67996830	
13,100.00	89.00	150.00	6,852.62	-6,720.05	3,787.14	14,450,457.26	1,730,365.45	39.79008519	-80.67979144	
13,200.00	89.00	150.00	6,854.36	-6,806.64	3,837.13	14,450,370.67	1,730,415.44	39.78984691	-80.67961458	
13,300.00	89.00	150.00	6,856.11	-6,893.23	3,887.12	14,450,284.08	1,730,465.43	39.78960862	-80.67943772	
13,400.00	89.00	150.00	6,857.86	-6,979.82	3,937.11	14,450,197.49	1,730,515.43	39.78937033	-80.67926086	
13,500.00	89.00	150.00	6,859.61	-7,066.41	3,987.11	14,450,110.90	1,730,565.42	39.78913204	-80.67908400	
13,600.00	89.00	150.00	6,861.36	-7,153.00	4,037.10	14,450,024.31	1,730,615.41	39.78889375	-80.67890715	
13,700.00	89.00	150.00	6,863.11	-7,239.59	4,087.09	14,449,937.72	1,730,665.40	39.78865547	-80.67873029	
13,800.00	89.00	150.00	6,864.86	-7,326.18	4,137.08	14,449,851.13	1,730,715.39	39.78841718	-80.67855344	
13,900.00	89.00	150.00	6,866.60	-7,412.77	4,187.07	14,449,764.54	1,730,765.39	39.78817889	-80.67837658	
14,000.00	89.00	150.00	6,868.35	-7,499.36	4,237.07	14,449,677.95	1,730,815.38	39.78794060	-80.67819973	
14,100.00	89.00	150.00	6,870.10	-7,585.95	4,287.06	14,449,591.37	1,730,865.37	39.78770231	-80.67802288	
14,200.00	89.00	150.00	6,871.85	-7,672.54	4,337.05	14,449,504.78	1,730,915.36	39.78746402	-80.67784603	
14,300.00	89.00	150.00	6,873.60	-7,759.13	4,387.04	14,449,418.19	1,730,965.36	39.78722573	-80.67766918	
14,400.00	89.00	150.00	6,875.35	-7,845.72	4,437.04	14,449,331.60	1,731,015.35	39.78698744	-80.67749234	
14,500.00	89.00	150.00	6,877.10	-7,932.31	4,487.03	14,449,245.01	1,731,065.34	39.78674915	-80.67731549	
14,600.00	89.00	150.00	6,878.84	-8,018.89	4,537.02	14,449,158.42	1,731,115.33	39.78651085	-80.67713865	
14,700.00	89.00	150.00	6,880.59	-8,105.48	4,587.01	14,449,071.83	1,731,165.32	39.78627256	-80.67696180	
14,800.00	89.00	150.00	6,882.34	-8,192.07	4,637.00	14,448,985.24	1,731,215.32	39.78603427	-80.67678496	



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 3-4 HM
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1326.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1326.00usft
Site:	Heaven Hill 3	North Reference:	Grid
Well:	Heaven Hill 3-4 HM	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
14,894.92	89.00	150.00	6,884.00	-8,274.26	4,684.46	14,448,903.05	1,731,262.77	39.78580809	-80.67661711
PBHL/TD 14894.92 MD/6884.00 TVD									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Heaven Hill 3-4 HM LP r - plan hits target center - Point	0.00	0.00	6,752.00	-1,737.26	910.33	14,455,440.06	1,727,488.64	39.80379700	-80.68997100
Heaven Hill 3-4 HM BHL - plan hits target center - Point	0.00	0.01	6,884.00	-8,274.26	4,684.46	14,448,903.05	1,731,262.77	39.78580809	-80.67661711

Casing Points						
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")		
120.00	120.00	30" Csaing @ 120 TVD	30	36		
1,090.00	1,090.00	13 3/8" Casing @ 1090 TVD	13-3/8	17		
2,802.06	2,800.00	9 5/8" Casing @ 2800 TVD	9-5/8	12-1/4		

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment	
1,200.00	1,200.00	0.00	0.00	KOP Begin 2°/100' build	
1,350.00	1,349.93	-3.49	1.79	Begin 3.00° tangent	
3,002.33	3,000.00	-80.46	41.22	Begin 2°/100' build/turn	
4,098.93	4,057.69	-314.56	161.18	Begin 24.93° tangent	
6,704.48	6,420.43	-1,292.07	662.04	Begin 10°/100' build/turn	
7,345.50	6,752.00	-1,737.26	910.33	Begin 89.00° lateral section	
14,894.92	6,884.00	-8,274.26	4,684.46	PBHL/TD 14894.92 MD/6884.00 TVD	

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**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 sheets

**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

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The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

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

WW-6A1 Supplement

Operator's Well No. Heaven Hill 3 - 4HM1

03/02/2018

Lease Name or No.	Tag	Parcel	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment
10*15557	A	9-7-30	RICKY L WHITLATCH ET AL	CHEVRON USA INC	1/8+	780	N/A	N/A	Chevron to Tug Hill: 36/148
10*15557	B	9-7-21	RICKY L WHITLATCH ET AL	CHEVRON USA INC	1/8+	780	N/A	N/A	Chevron to Tug Hill: 36/148
10*47051.256.22	C	9-7-23	BEVERLY J HOPSON	TH EXPLORATION LLC	1/8+	913	N/A	N/A	N/A
10*47051.256.1	C	9-7-23	BRENDA J WHETZEL	TH EXPLORATION LLC	1/8+	881	N/A	N/A	N/A
10*15746	C	9-7-23	BRUCE D SCHURR	TH EXPLORATION LLC	1/8+	921	N/A	N/A	N/A
10*16247	C	9-7-23	CAROL RIGGLE PARSLEY AND JAMES DENNIS PARSLEY	TH EXPLORATION LLC	1/8+	925	N/A	N/A	N/A
10*47051.256.24	C	9-7-23	CATHERINE BONAR PETTI BILLIE	TH EXPLORATION LLC	1/8+	904	N/A	N/A	N/A
10*47051.256.16	C	9-7-23	CHARLOTTE B HUMMEL	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.15	C	9-7-23	CHARLOTTE J BONAR YOHO	TH EXPLORATION LLC	1/8+	904	N/A	N/A	N/A
10*17506	C	9-7-23	CHASKIA F HARRIS AND JAMES M HARRIS	TH EXPLORATION LLC	1/8+	919	N/A	N/A	N/A
10*17507	C	9-7-23	DEZRAY METCALF	TH EXPLORATION LLC	1/8+	919	N/A	N/A	N/A
10*17415	C	9-7-23	DILLON PITSENBARGER	TH EXPLORATION LLC	1/8+	919	N/A	N/A	N/A
10*16115	C	9-7-23	EARL W HARRIS	TH EXPLORATION LLC	1/8+	925	N/A	N/A	N/A
10*47051.256.10	C	9-7-23	GRACE LAURA BONAR	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.14	C	9-7-23	HUGH R BUZZARD	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.21	C	9-7-23	JACK L MASON AND JEAN M MASON	TH EXPLORATION LLC	1/8+	904	N/A	N/A	N/A
10*47051.256.20	C	9-7-23	JEFFREY THOMAS PYLES AND TERESA A PYLES	TH EXPLORATION LLC	1/8+	907	N/A	N/A	N/A
10*47051.256.11	C	9-7-23	JOHN L MASON	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.18	C	9-7-23	JOHN WILLIAM BONAR AND SHIRLEY BONAR	TH EXPLORATION LLC	1/8+	913	N/A	N/A	N/A
10*47051.256.7	C	9-7-23	MARILYN SUE BUMER	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.17	C	9-7-23	MAXINE G JOHNSON	TH EXPLORATION LLC	1/8+	904	N/A	N/A	N/A
10*47051.256.8	C	9-7-23	MICHAEL DAVID PYLES AND CYNTHIA A PYLES	TH EXPLORATION LLC	1/8+	907	N/A	N/A	N/A
10*47051.256.19	C	9-7-23	PAMELA ANN MASON	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.23	C	9-7-23	ROBERT L BONAR	TH EXPLORATION LLC	1/8+	913	N/A	N/A	N/A
10*47051.256.12	C	9-7-23	STEVEN A BOHRER	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*16021	C	9-7-23	TOMMY BONAR AND TANVA S BONAR	TH EXPLORATION LLC	1/8+	925	N/A	N/A	N/A
10*47051.256.9	C	9-7-23	WANDA MASON SUNSHINE	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.13	C	9-7-23	WILLIAM W CRAIG AND GLENDA L CRAIG	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.22	D	9-11-7	BEVERLY J HOPSON	TH EXPLORATION LLC	1/8+	913	N/A	N/A	N/A
10*47051.256.1	D	9-11-7	BRENDA J WHETZEL	TH EXPLORATION LLC	1/8+	881	N/A	N/A	N/A
10*15746	D	9-11-7	BRUCE D SCHURR	TH EXPLORATION LLC	1/8+	921	N/A	N/A	N/A
10*16247	D	9-11-7	CAROL RIGGLE PARSLEY AND JAMES DENNIS PARSLEY	TH EXPLORATION LLC	1/8+	925	N/A	N/A	N/A
10*47051.256.24	D	9-11-7	CATHERINE BONAR PETTI BILLIE	TH EXPLORATION LLC	1/8+	904	N/A	N/A	N/A
10*47051.256.16	D	9-11-7	CHARLOTTE B HUMMEL	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.15	D	9-11-7	CHASKIA F HARRIS AND JAMES M HARRIS	TH EXPLORATION LLC	1/8+	904	N/A	N/A	N/A
10*17506	D	9-11-7	DEZRAY METCALF	TH EXPLORATION LLC	1/8+	919	N/A	N/A	N/A
10*17507	D	9-11-7	DILLON PITSENBARGER	TH EXPLORATION LLC	1/8+	919	N/A	N/A	N/A
10*17415	D	9-11-7	EARL W HARRIS	TH EXPLORATION LLC	1/8+	925	N/A	N/A	N/A
10*16115	D	9-11-7	GRACE LAURA BONAR	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.10	D	9-11-7	HUGH R BUZZARD	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.21	D	9-11-7	JACK L MASON AND JEAN M MASON	TH EXPLORATION LLC	1/8+	904	N/A	N/A	N/A
10*47051.256.20	D	9-11-7	JEFFREY THOMAS PYLES AND TERESA A PYLES	TH EXPLORATION LLC	1/8+	907	N/A	N/A	N/A
10*47051.256.11	D	9-11-7	JOHN L MASON	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.18	D	9-11-7	JOHN WILLIAM BONAR AND SHIRLEY BONAR	TH EXPLORATION LLC	1/8+	913	N/A	N/A	N/A
10*47051.256.7	D	9-11-7	MARILYN SUE BUMER	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.17	D	9-11-7	MAXINE G JOHNSON	TH EXPLORATION LLC	1/8+	904	N/A	N/A	N/A

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10*47051.256.19	D	9-11-7	MICHAEL DAVID PYLES AND CYNTHIA A PYLES	TH EXPLORATION LLC	1/8+	907 207	N/A	N/A	N/A
10*47051.256.8	D	9-11-7	PAMELA ANN MASON	TH EXPLORATION LLC	1/8+	905 31	N/A	N/A	N/A
10*47051.256.23	D	9-11-7	ROBERT L BONAR	TH EXPLORATION LLC	1/8+	913 556	N/A	N/A	N/A
10*47051.256.12	D	9-11-7	STEVEN A BOHRER	TH EXPLORATION LLC	1/8+	905 39	N/A	N/A	N/A
10*16021	D	9-11-7	TOMMY BONAR AND TANVA S BONAR	TH EXPLORATION LLC	1/8+	925 325	N/A	N/A	N/A
10*47051.256.9	D	9-11-7	WANDA MASON SUNSHINE	TH EXPLORATION LLC	1/8+	905 33	N/A	N/A	N/A
10*47051.256.13	D	9-11-7	WILLIAM W CRAIG AND GLENDA L CRAIG	TH EXPLORATION LLC	1/8+	905 41	N/A	N/A	N/A
10*16514	E	9-11-8	ALEX RUSSELL AND JOYCE A CAMPBELL	TH EXPLORATION LLC	1/8+	908 248	N/A	N/A	N/A
10*47051.223.12	E	9-11-8	Alice GORBY MARTIN	TH EXPLORATION, LLC	1/8+	908 52	N/A	N/A	N/A
10*17416	E	9-11-8	ANDREW M. ORTIZ	TH EXPLORATION, LLC	1/8+	921 346	N/A	N/A	N/A
10*16515	E	9-11-8	ANNA MARIE JACKSON	TH EXPLORATION LLC	1/8+	908 251	N/A	N/A	N/A
10*47051.223.20	E	9-11-8	BARBARA A BUZZARD	TH EXPLORATION LLC	1/8+	908 24	N/A	N/A	N/A
10*17276	E	9-11-8	BERTHA EZZEL WYATT	TH EXPLORATION LLC	1/8+	921 526	N/A	N/A	N/A
10*47051.223.16	E	9-11-8	BETTY LOU STERN AND WILLIAM KEITH STERN	TH EXPLORATION LLC	1/8+	908 64	N/A	N/A	N/A
10*16880	E	9-11-8	BEVERLY ANN STORTS	TH EXPLORATION LLC	1/8+	921 498	N/A	N/A	N/A
10*16989	E	9-11-8	BRITTANY RICHARDSON	TH EXPLORATION LLC	1/8+	921 376	N/A	N/A	N/A
10*47051.223.18	E	9-11-8	BRITTNEY MEENEAR	TH EXPLORATION LLC	1/8+	908 57	N/A	N/A	N/A
10*15463	E	9-11-8	CHARLES A RINE	TH EXPLORATION LLC	1/8+	908 274	N/A	N/A	N/A
10*16667	E	9-11-8	CHARLES F AND GAIL ANN PYLE	TH EXPLORATION LLC	1/8+	908 266	N/A	N/A	N/A
10*16686	E	9-11-8	CHERYLE M TRACEY	TH EXPLORATION LLC	1/8+	927 475	N/A	N/A	N/A
10*16802	E	9-11-8	CHRISTOPHER AND TAMMY RICHARDSON	TH EXPLORATION LLC	1/8+	921 495	N/A	N/A	N/A
10*17130	E	9-11-8	CINDY L BARGER	TH EXPLORATION LLC	1/8+	921 137	N/A	N/A	N/A
10*16416	E	9-11-8	CYNTHIA HUDSON	TH EXPLORATION, LLC	1/8+	908 219	N/A	N/A	N/A
10*17274	E	9-11-8	DAVID H WILSON	TH EXPLORATION LLC	1/8+	921 474	N/A	N/A	N/A
10*47051.223.8	E	9-11-8	DAVID M WILSON	TH EXPLORATION LLC	1/8+	907 649	N/A	N/A	N/A
10*16807	E	9-11-8	DAVID TULLER AND SUSAN STORTS TULLER	TH EXPLORATION LLC	1/8+	921 513	N/A	N/A	N/A
10*15481	E	9-11-8	DEAN P RIGBY AND SUSAN RIGBY	TH EXPLORATION LLC	1/8+	908 197	N/A	N/A	N/A
10*47051.223.35	E	9-11-8	DEBRA L CIAFFAGLIONE	TH EXPLORATION LLC	1/8+	908 190	N/A	N/A	N/A
10*17438	E	9-11-8	DENNIS M WILSON	TH EXPLORATION LLC	1/8+	921 476	N/A	N/A	N/A
10*16962	E	9-11-8	DENNIS P AND BARBARA EZZEL FLORY	TH EXPLORATION LLC	1/8+	921 70	N/A	N/A	N/A
10*16720	E	9-11-8	DONNA ELAINE BRASKETT	TH EXPLORATION LLC	1/8+	921 152	N/A	N/A	N/A
10*47051.223.11	E	9-11-8	ELIZABETH ESTEP	TH EXPLORATION LLC	1/8+	908 37	N/A	N/A	N/A
10*47051.223.21	E	9-11-8	GARY T WARD AND SHARON D WARD	TH EXPLORATION LLC	1/8+	908 19	N/A	N/A	N/A
10*16298	E	9-11-8	GEOFFREY A SHIEFFER AND STEPHANIE L SCHIEFFER	TH EXPLORATION, LLC	1/8+	908 238	N/A	N/A	N/A
10*17677	E	9-11-8	GEORGE M GONTA JR	TH EXPLORATION, LLC	1/8+	921 89	N/A	N/A	N/A
10*47051.223.5	E	9-11-8	HAROLD S BROWN II AND MARIA A BROWN	TH EXPLORATION LLC	1/8+	907 641	N/A	N/A	N/A
10*16815	E	9-11-8	HAROLD W PYLE	TH EXPLORATION LLC	1/8+	921 357	N/A	N/A	N/A
10*17156	E	9-11-8	HENRI NELL JACKSON KENT BARNES	TH EXPLORATION LLC	1/8+	921 139	N/A	N/A	N/A
10*16668	E	9-11-8	JACK I AND MERRILEE PYLE	TH EXPLORATION LLC	1/8+	908 257	N/A	N/A	N/A
10*47051.223.7	E	9-11-8	JACK R WILSON JR AND JANE A WILSON	TH EXPLORATION LLC	1/8+	908 4	N/A	N/A	N/A
10*47051.223.13	E	9-11-8	JAMES A GORBY	TH EXPLORATION LLC	1/8+	908 42	N/A	N/A	N/A
10*16839	E	9-11-8	JAMES B FOUNDS AND LYNN M MOWERY	TH EXPLORATION LLC	1/8+	921 73	N/A	N/A	N/A
10*16800	E	9-11-8	JAMES KENNETH JACKSON AND JULIE JACKSON	TH EXPLORATION LLC	1/8+	921 93	N/A	N/A	N/A
10*17588	E	9-11-8	JAMES M JACKSON	TH EXPLORATION LLC	1/8+	921 325	N/A	N/A	N/A
10*17527	E	9-11-8	JAMES MICHAEL EZZEL AND LUCILLE D EZZEL	TH EXPLORATION LLC	1/8+	921 111	N/A	N/A	N/A
10*17157	E	9-11-8	JAMES N REEVES JR AND RITA M REEVES	TH EXPLORATION LLC	1/8+	921 367	N/A	N/A	N/A
10*17564	E	9-11-8	JAMES R & TRACEY E NICKOLSON	TH EXPLORATION, LLC	1/8+	921 340	N/A	N/A	N/A

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10*47051.223.31	E	9-11-8	JANICE M GONITA GAVALIK	TH EXPLORATION LLC	1/8+	908 180	N/A	N/A	N/A
10*47051.223.19	E	9-11-8	JASON RINE AND HEATHER RINE	TH EXPLORATION LLC	1/8+	907 629	N/A	N/A	N/A
10*47051.223.1	E	9-11-8	JEAN ANNE GORBY STORCH	TH EXPLORATION LLC	1/8+	877 216	N/A	N/A	N/A
10*17526	E	9-11-8	JEFFREY L REEVES AND JODY L REEVES	TH EXPLORATION LLC	1/8+	921 370	N/A	N/A	N/A
10*16977	E	9-11-8	JEREMY COCHENDOUR	TH EXPLORATION LLC	1/8+	921 102	N/A	N/A	N/A
10*17565	E	9-11-8	JESSE ALLEN JACKSON AND ELIZABETH D JACKSON	TH EXPLORATION LLC	1/8+	921 327	N/A	N/A	N/A
10*17155	E	9-11-8	JESSE LEON JR AND TERESA GAIL EZELE	TH EXPLORATION LLC	1/8+	921 118	N/A	N/A	N/A
10*47051.223.24	E	9-11-8	JO DEE K DAVIS	TH EXPLORATION LLC	1/8+	908 136	N/A	N/A	N/A
10*47051.223.25	E	9-11-8	JOANNE WELCH	TH EXPLORATION LLC	1/8+	908 141	N/A	N/A	N/A
10*17552	E	9-11-8	JOHN BEVACQUA AND PATRICIA A BEVACQUA	TH EXPLORATION LLC	1/8+	921 144	N/A	N/A	N/A
10*16689	E	9-11-8	JOHN C FOUNDS	TH EXPLORATION LLC	1/8+	927 490	N/A	N/A	N/A
10*47051.223.34	E	9-11-8	JOHN GIAPFAGLIONE	TH EXPLORATION LLC	1/8+	908 170	N/A	N/A	N/A
10*15686	E	9-11-8	JOHN OMER BOLTZ	TH EXPLORATION LLC	1/8+	908 160	N/A	N/A	N/A
10*17275	E	9-11-8	JOHN R REEVES AND MONA G REEVES	TH EXPLORATION LLC	1/8+	921 373	N/A	N/A	N/A
10*16669	E	9-11-8	JOHN S AND PATRICIA S DADO	TH EXPLORATION LLC	1/8+	908 269	N/A	N/A	N/A
10*47051.223.32	E	9-11-8	JOSEPH GORBY DAKAN	TH EXPLORATION LLC	1/8+	908 175	N/A	N/A	N/A
10*17339	E	9-11-8	JOSEPH W FOUNDS	TH EXPLORATION LLC	1/8+	921 75	N/A	N/A	N/A
10*47051.223.6	E	9-11-8	JOSHUA RINE AND REBECCA RINE	TH EXPLORATION LLC	1/8+	907 634	N/A	N/A	N/A
10*47051.223.14	E	9-11-8	JUSTIN RINE AND BECKY RINE	TH EXPLORATION LLC	1/8+	907 639	N/A	N/A	N/A
10*47051.223.28	E	9-11-8	KAREN S GAST	TH EXPLORATION LLC	1/8+	908 150	N/A	N/A	N/A
10*17561	E	9-11-8	KATHRYN L & ROGER L TYRELL	TH EXPLORATION, LLC	1/8+	921 519	N/A	N/A	N/A
10*17444	E	9-11-8	KELLY FOUNDS CAMPBELL	TH EXPLORATION LLC	1/8+	921 99	N/A	N/A	N/A
10*17440	E	9-11-8	KENDRA WALISA	TH EXPLORATION LLC	1/8+	927 484	N/A	N/A	N/A
10*47051.223.15	E	9-11-8	LARRY D TAUNT AND NANCY L TAUNT	TH EXPLORATION LLC	1/8+	908 14	N/A	N/A	N/A
10*47051.223.30	E	9-11-8	LAURIE DRIGGERS MANDERSON	TH EXPLORATION LLC	1/8+	908 165	N/A	N/A	N/A
10*16987	E	9-11-8	LAURIE EZELE PERRY	TH EXPLORATION LLC	1/8+	921 355	N/A	N/A	N/A
10*16976	E	9-11-8	LESTER G AND CONSTANCE B NICKOLSON	TH EXPLORATION LLC	1/8+	921 343	N/A	N/A	N/A
10*47051.223.9	E	9-11-8	LINDA DELBERT	TH EXPLORATION LLC	1/8+	908 32	N/A	N/A	N/A
10*17485	E	9-11-8	MARGIE ANN JACKSON ROBBINS GRAHAM	TH EXPLORATION LLC	1/8+	921 91	N/A	N/A	N/A
10*16478	E	9-11-8	MARION L AND EMILY CAMPBELL	TH EXPLORATION LLC	1/8+	908 245	N/A	N/A	N/A
10*16879	E	9-11-8	MARK E AND LESLEY A STORTS	TH EXPLORATION LLC	1/8+	921 501	N/A	N/A	N/A
10*16902	E	9-11-8	MARY BARCAW DUKE	TH EXPLORATION LLC	1/8+	921 105	N/A	N/A	N/A
10*17589	E	9-11-8	MARY CHRISTINE MCKENNA	TH EXPLORATION, LLC	1/8+	921 332	N/A	N/A	N/A
10*16414	E	9-11-8	MARY ELIZABETH DRIGGERS	TH EXPLORATION, LLC	1/8+	908 208	N/A	N/A	N/A
10*16991	E	9-11-8	MARYELLEN FOUNDS AND LAUREN FOUNDS	TH EXPLORATION LLC	1/8+	921 79	N/A	N/A	N/A
10*16058	E	9-11-8	MAITIE RUTH JACKSON PRESCOTT	TH EXPLORATION LLC	1/8+	908 231	N/A	N/A	N/A
10*17278	E	9-11-8	MICHAEL L EZELE	TH EXPLORATION LLC	1/8+	921 121	N/A	N/A	N/A
10*16808	E	9-11-8	MICHAEL L ORTIZ	TH EXPLORATION LLC	1/8+	921 349	N/A	N/A	N/A
10*16666	E	9-11-8	MICHAEL P PYLE	TH EXPLORATION LLC	1/8+	908 255	N/A	N/A	N/A
10*17554	E	9-11-8	MICHAEL T RANKIN	TH EXPLORATION LLC	1/8+	921 361	N/A	N/A	N/A
10*16868	E	9-11-8	MICHAEL W STORTS AND JESSICA M STORTS	TH EXPLORATION LLC	1/8+	921 504	N/A	N/A	N/A
10*17443	E	9-11-8	MICHELE MORROW-BACK	TH EXPLORATION LLC	1/8+	921 337	N/A	N/A	N/A
10*17377	E	9-11-8	MILTON HOWARD EZELE JR AND ELIZABETH A EZELE	TH EXPLORATION LLC	1/8+	921 123	N/A	N/A	N/A
10*47051.223.33	E	9-11-8	NANCY GIAPFAGLIONE HOUSLEY	TH EXPLORATION LLC	1/8+	908 185	N/A	N/A	N/A
10*17566	E	9-11-8	NATHAN P & BARBARA T ERDOSSY	TH EXPLORATION, LLC	1/8+	921 108	N/A	N/A	N/A
10*17484	E	9-11-8	NELDA S JACKSON	TH EXPLORATION LLC	1/8+	921 330	N/A	N/A	N/A
10*16798	E	9-11-8	PATRICK A RANKIN AND ROBIN A RANKIN	TH EXPLORATION LLC	1/8+	921 364	N/A	N/A	N/A

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10*17208	E	9-11-8	PATRICK S GALLAGHER AND JOYCE ANN FOUNDS	TH EXPLORATION LLC	1/8+	921 86	N/A	N/A	N/A
10*47051.223.29	E	9-11-8	PATSY JO RAU	TH EXPLORATION LLC	1/8+	908 155	N/A	N/A	N/A
10*16742	E	9-11-8	PAUL C WILSON	TH EXPLORATION LLC	1/8+	927 490	N/A	N/A	N/A
10*17449	E	9-11-8	PHYLLIS J BLAKE	TH EXPLORATION LLC	1/8+	921 150	N/A	N/A	N/A
10*47051.223.17	E	9-11-8	RALPH E HUNTER JR AND CHARLOTTE HUNTER	TH EXPLORATION LLC	1/8+	908 9	N/A	N/A	N/A
10*17441	E	9-11-8	RALPH J WILSON	TH EXPLORATION LLC	1/8+	921 522	N/A	N/A	N/A
10*16448	E	9-11-8	RALPH L AND JUANITA L CRIM	TH EXPLORATION LLC	1/8+	908 584	N/A	N/A	N/A
10*16690	E	9-11-8	RICARDO ORTIZ	TH EXPLORATION LLC	1/8+	921 352	N/A	N/A	N/A
10*17483	E	9-11-8	RICHARD I PYLE	TH EXPLORATION LLC	1/8+	921 359	N/A	N/A	N/A
10*16662	E	9-11-8	RICHARD THOMAS AND VICKI J MIMS	TH EXPLORATION LLC	1/8+	908 863	N/A	N/A	N/A
10*16836	E	9-11-8	RICK A AND LENORE A STORTS	TH EXPLORATION LLC	1/8+	921 507	N/A	N/A	N/A
10*16297	E	9-11-8	ROBERT A LEADBETTER AND M REBECCA LEADBETTER	TH EXPLORATION LLC	1/8+	908 235	N/A	N/A	N/A
10*47051.223.10	E	9-11-8	ROBERT E GORBY	TH EXPLORATION LLC	1/8+	908 47	N/A	N/A	N/A
10*16545	E	9-11-8	ROBERT G & ELLEN FOUNDS	TH EXPLORATION LLC	1/8+	908 260	N/A	N/A	N/A
10*16838	E	9-11-8	ROBERT G FUNARI	TH EXPLORATION LLC	1/8+	921 82	N/A	N/A	N/A
10*16424	E	9-11-8	ROBERT J RIGBY	TH EXPLORATION, LLC	1/8+	908 241	N/A	N/A	N/A
10*16383	E	9-11-8	ROBERT STEPHEN DRIGGERS	TH EXPLORATION LLC	1/8+	908 224	N/A	N/A	N/A
10*47051.223.23	E	9-11-8	RONALD S CRIM	TH EXPLORATION LLC	1/8+	908 79	N/A	N/A	N/A
10*16118	E	9-11-8	RUBY RIDGLE JACKSON	TH EXPLORATION LLC	1/8+	908 233	N/A	N/A	N/A
10*47051.223.22	E	9-11-8	SALLY COLE	TH EXPLORATION LLC	1/8+	908 74	N/A	N/A	N/A
10*17744	E	9-11-8	SAM PRESLEY EZELL	TH EXPLORATION LLC	1/8+	921 116	N/A	N/A	N/A
10*17205	E	9-11-8	SANDRA JEAN WILSON	TH EXPLORATION LLC	1/8+	921 524	N/A	N/A	N/A
10*15750	E	9-11-8	SANDRA K TRULL	TH EXPLORATION LLC	1/8+	908 229	N/A	N/A	N/A
10*17442	E	9-11-8	SHANE ALLEN AND MENDY JEAN ALLEN	TH EXPLORATION LLC	1/8+	921 134	N/A	N/A	N/A
10*16821	E	9-11-8	SHEILA BRASKETT WEICHEY	TH EXPLORATION LLC	1/8+	921 516	N/A	N/A	N/A
10*16688	E	9-11-8	SHERRYL PYLE BAIR	TH EXPLORATION LLC	1/8+	927 481	N/A	N/A	N/A
10*15482	E	9-11-8	SUSAN NELSON	TH EXPLORATION LLC	1/8+	908 203	N/A	N/A	N/A
10*16415	E	9-11-8	TERENCE J & NANCY J ANDERSON	TH EXPLORATION, LLC	1/8+	908 231	N/A	N/A	N/A
10*17482	E	9-11-8	TERESA EZEILE RALVA AND DAVID L RALVA	TH EXPLORATION LLC	1/8+	927 487	N/A	N/A	N/A
10*16819	E	9-11-8	TERESA ORTIZ BIGGS	TH EXPLORATION LLC	1/8+	921 147	N/A	N/A	N/A
10*16837	E	9-11-8	TERRY L AND THELMA A POFF	TH EXPLORATION LLC	1/8+	927 472	N/A	N/A	N/A
10*17198	E	9-11-8	THOMAS G AND DIANE W BAYLESS	TH EXPLORATION LLC	1/8+	921 141	N/A	N/A	N/A
10*16996	E	9-11-8	THOMAS RANKIN	TH EXPLORATION LLC	1/8+	917 75	N/A	N/A	N/A
10*47051.223.27	E	9-11-8	TIMI J HOBBS	TH EXPLORATION LLC	1/8+	908 277	N/A	N/A	N/A
10*16863	E	9-11-8	TINA MOORE	TH EXPLORATION LLC	1/8+	921 334	N/A	N/A	N/A
10*16806	E	9-11-8	VIRGINIA I WHITMAN	TH EXPLORATION LLC	1/8+	921 528	N/A	N/A	N/A
10*47051.223.26	E	9-11-8	WENDY L SMARREL	TH EXPLORATION LLC	1/8+	908 69	N/A	N/A	N/A
10*16747	E	9-11-8	WILLIAM DALE BRASKETT	TH EXPLORATION LLC	1/8+	921 96	N/A	N/A	N/A
10*16804	E	9-11-8	WILLIAM N AND SHERRY D TAYLOR	TH EXPLORATION LLC	1/8+	921 510	N/A	N/A	N/A
10*16516	E	9-11-8	WILSON ANDREW JACKSON	TH EXPLORATION LLC	1/8+	908 253	N/A	N/A	N/A
10*15606	F	9-12-2	CHK-MAC LLC	CHESAPEAKE APPALACHIA LLC	1/8+	798 150	N/A	Chesapeake to Chevron: 30/461	Chevron to Tug Hill: 36/148
10*47051.309.3	F	9-12-2	GERALD W QUIGLEY AND VICKI L QUIGLEY	TH EXPLORATION LLC	1/8+	905 12	N/A	N/A	N/A
10*16932	F	9-12-2	HAYMAKER PROPERTIES LP	CHEVRON U.S.A. INC.	1/8+	902 447	N/A	N/A	Chevron to Tug Hill: 37/437
10*47051.309.1	F	9-12-2	LESLE E QUIGLEY	TH EXPLORATION LLC	1/8+	905 8	N/A	N/A	N/A
10*47051.309.2	F	9-12-2	LEWIS M QUIGLEY AND MAXINE V QUIGLEY	TH EXPLORATION LLC	1/8+	907 217	N/A	N/A	N/A
10*16238	F	9-12-2	SUSAN MARIE JOHNSON AKA SUSAN MARIE HUBER	TH EXPLORATION LLC	1/8+	924 614	N/A	N/A	N/A
10*16244	G	9-12-1	EMILY ANN NICFOROS	TH EXPLORATION LLC	1/8+	924 617	N/A	N/A	N/A

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Lease Name or No.	Tag	Parcel	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment
10*16149	G	9-12-1	THOMAS MICHAEL WALLACE	TH EXPLORATION LLC	1/8+	924 610	N/A	N/A	N/A
10*47051.333.1	G	9-12-1	THOMAS S RIGGS III	TH EXPLORATION LLC	1/8+	904 556	N/A	N/A	N/A
10*47051.333.2	G	9-12-1	WILLIAM MARTIN RIGGS ANGELA RAE MOORE	TH EXPLORATION LLC	1/8+	907 220	N/A	N/A	N/A
10*16244	H	9-12-31	EMILY ANN NICFOROS	TH EXPLORATION LLC	1/8+	924 617	N/A	N/A	N/A
10*15603	H	9-12-31	HAYHURST COMPANY A FLORIDA PARTNERSHIP	CHESAPEAKE APPALACHIA LLC	1/8+	727 253	N/A	Chesapeake to Chevron: 30/461	N/A
10*16149	H	9-12-31	THOMAS MICHAEL WALLACE	TH EXPLORATION LLC	1/8+	924 610	N/A	N/A	Chevron to Tug Hill: 36/148
10*47051.333.1	H	9-12-31	THOMAS S RIGGS III	TH EXPLORATION LLC	1/8+	904 556	N/A	N/A	N/A
10*47051.333.2	H	9-12-31	WILLIAM MARTIN RIGGS ANGELA RAE MOORE	TH EXPLORATION LLC	1/8+	907 220	N/A	N/A	N/A
10*17555	I	9-14-18	AARON AND JANA K PARRY	TH EXPLORATION LLC	1/8+	924 113	N/A	N/A	N/A
10*17452	I	9-14-18	ALAN H & MARY K DEGARMO	TH EXPLORATION, LLC	1/8+	924 164	N/A	N/A	N/A
10*17139	I	9-14-18	ALICE G WEINER AND GERALD S WEINER	TH EXPLORATION LLC	1/8+	915 131	N/A	N/A	N/A
10*16183	I	9-14-18	ALLEN R L DAVIS AND DIANA LEE PATTERSON	TH EXPLORATION LLC	1/8+	906 285	N/A	N/A	N/A
10*17436	I	9-14-18	ANDREW M HOOVER AND DINAH R HOOVER	TH EXPLORATION LLC	1/8+	924 156	N/A	N/A	N/A
10*16239	I	9-14-18	ANGELA L OLDFIELD AND KENNETH W OLDFIELD	TH EXPLORATION LLC	1/8+	906 287	N/A	N/A	N/A
10*17880	I	9-14-18	ANNA M WRIGHT	TH EXPLORATION, LLC	1/8+	924 586	N/A	N/A	N/A
10*16443	I	9-14-18	BARBARA BROWN CHAMBERS	TH EXPLORATION LLC	1/8+	924 621	N/A	N/A	N/A
10*16018	I	9-14-18	BARBARA MCFADDEN ALBRIGHT	TH EXPLORATION LLC	1/8+	906 262	N/A	N/A	N/A
10*17708	I	9-14-18	BETTY LOU NOBLE	TH EXPLORATION LLC	1/8+	923 127	N/A	N/A	N/A
10*17612	I	9-14-18	BEVERLY A LEDBETTER	TH EXPLORATION, LLC	1/8+	923 480	N/A	N/A	N/A
10*16240	I	9-14-18	BONNIE SUE PATTERSON SWISHER	TH EXPLORATION LLC	1/8+	906 289	N/A	N/A	N/A
10*17830	I	9-14-18	BRIAN AND MELINDA MASTERS	TH EXPLORATION LLC	1/8+	925 319	N/A	N/A	N/A
10*16031	I	9-14-18	CARL J CHMIELEWSKI AND KATHLEEN A CHMIELEWSKI	TH EXPLORATION LLC	1/8+	906 266	N/A	N/A	N/A
10*17613	I	9-14-18	CARLTON DOBBS JR AND MIKHAIL PROKOPENKO	TH EXPLORATION LLC	1/8+	924 120	N/A	N/A	N/A
10*16444	I	9-14-18	CATHERINE ELLEN CHAMBERS	TH EXPLORATION LLC	1/8+	924 623	N/A	N/A	N/A
10*16083	I	9-14-18	CECIL HARRY LILLY, III AND PAMELA KAY KNIGHT LILLY	TH EXPLORATION LLC	1/8+	912 47	N/A	N/A	N/A
10*17771	I	9-14-18	CHARLES AND USA WARRICK	TH EXPLORATION, LLC	1/8+	923 477	N/A	N/A	N/A
10*16535	I	9-14-18	CHARLES E CARSON AND MARY KAY CARSON	TH EXPLORATION LLC	1/8+	906 420	N/A	N/A	N/A
10*17396	I	9-14-18	CHRISTINE L KIDD	TH EXPLORATION LLC	1/8+	924 158	N/A	N/A	N/A
10*16486	I	9-14-18	DAVID ALAN WILKINSON AND PATRICIA LYNN WILKINSON	TH EXPLORATION LLC	1/8+	924 180	N/A	N/A	N/A
10*17614	I	9-14-18	DAVID DOBBS	TH EXPLORATION, LLC	1/8+	923 489	N/A	N/A	N/A
10*17528	I	9-14-18	DEAN E GARRISON	TH EXPLORATION LLC	1/8+	923 535	N/A	N/A	N/A
10*17487	I	9-14-18	DEBORAH R MOKOSH	TH EXPLORATION LLC	1/8+	924 166	N/A	N/A	N/A
10*17711	I	9-14-18	DEBRA A WENNEMAN AND KURT J WENNEMAN	TH EXPLORATION LLC	1/8+	923 520	N/A	N/A	N/A
10*16995	I	9-14-18	DIANE ELISE RAMSEY	TH EXPLORATION LLC	1/8+	924 146	N/A	N/A	N/A
10*17579	I	9-14-18	DON COFFIELD & GLENDA DOBBS	TH EXPLORATION, LLC	1/8+	923 525	N/A	N/A	N/A
10*17563	I	9-14-18	DONALD L WOOD	TH EXPLORATION LLC	1/8+	923 523	N/A	N/A	N/A
10*16582	I	9-14-18	DONALD T AND JEAN K HOGAN	TH EXPLORATION LLC	1/8+	924 140	N/A	N/A	N/A
10*16445	I	9-14-18	DORA BROCK BRAMMER	TH EXPLORATION LLC	1/8+	907 429	N/A	N/A	N/A
10*16511	I	9-14-18	DOUGLAS C AND GWENDLYN D LEWTON	TH EXPLORATION LLC	1/8+	925 123	N/A	N/A	N/A
10*17766	I	9-14-18	DOUGLAS R BOWEN	TH EXPLORATION LLC	1/8+	906 475	N/A	N/A	N/A
10*16131	I	9-14-18	EDWARD S & NANCY A ROSENTHAL	TH EXPLORATION, LLC	1/8+	923 495	N/A	N/A	N/A
10*16835	I	9-14-18	ERIC S DOBBS	TH EXPLORATION LLC	1/8+	902 68	N/A	N/A	N/A
10*16182	I	9-14-18	ERNEST CARL AUGUSTINE JR	TH EXPLORATION LLC	1/8+	924 188	N/A	N/A	N/A
10*16017	I	9-14-18	FIRST CHRISTIAN CHURCH OF MOUNDSVILLE BY ROGER FRANCIS AND ROBERT ALBERT TRUSTEES	TH EXPLORATION LLC	1/8+	906 283	N/A	N/A	N/A
10*15730	I	9-14-18	FLOYD A MCFADDEN	TH EXPLORATION LLC	1/8+	906 260	N/A	N/A	N/A
10*16442	I	9-14-18	FRANCES V CARPENTER	TH EXPLORATION LLC	1/8+	906 256	N/A	N/A	N/A
10*16442	I	9-14-18	FRED T AND JERRY L CHAMBERS	TH EXPLORATION LLC	1/8+	924 174	N/A	N/A	N/A

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10*17448	I	9-14-18	FREDERICK L HERVEY AND CATHY J HERVEY	TH EXPLORATION LLC	1/8+	924 162	N/A	N/A	N/A
10*16948	I	9-14-18	FREDERICK M LEWTON	TH EXPLORATION LLC	1/8+	924 136	N/A	N/A	N/A
10*17209	I	9-14-18	GAYLE S SHANNON	TH EXPLORATION LLC	1/8+	924 168	N/A	N/A	N/A
10*16441	I	9-14-18	GEORGE FRANKLIN AND NANCY ANN REED	TH EXPLORATION LLC	1/8+	924 619	N/A	N/A	N/A
10*17515	I	9-14-18	GLADYS E DOBBS	TH EXPLORATION LLC	1/8+	923 541	N/A	N/A	N/A
10*17769	I	9-14-18	GLADYS FRAZIER KING	TH EXPLORATION, LLC	1/8+	923 492	N/A	N/A	N/A
10*17504	I	9-14-18	GREGG ALAN MILLER AND BETH ANN MILLER	TH EXPLORATION LLC	1/8+	924 118	N/A	N/A	N/A
10*17675	I	9-14-18	GREGORY D & CAROLYN J WIBLE	TH EXPLORATION, LLC	1/8+	923 507	N/A	N/A	N/A
10*16580	I	9-14-18	HAROLD C MCFADDEN	TH EXPLORATION LLC	1/8+	907 480	N/A	N/A	N/A
10*17289	I	9-14-18	HAROLD R HUNT JR AND ELIZABETH A HUNT	TH EXPLORATION LLC	1/8+	924 170	N/A	N/A	N/A
10*17879	I	9-14-18	HARRY R WRIGHT JR	TH EXPLORATION, LLC	1/8+	924 588	N/A	N/A	N/A
10*16581	I	9-14-18	HELEN L SCHILLING	TH EXPLORATION LLC	1/8+	907 489	N/A	N/A	N/A
10*17674	I	9-14-18	HOWARD L & BETH E WOOD	TH EXPLORATION, LLC	1/8+	923 505	N/A	N/A	N/A
10*16540	I	9-14-18	JAMES A WINTER AND CONNIE G WINTER	TH EXPLORATION LLC	1/8+	924 184	N/A	N/A	N/A
10*17676	I	9-14-18	JAMES C & DEIDRE G DORIA	TH EXPLORATION, LLC	1/8+	923 513	N/A	N/A	N/A
10*47051.325.4	I	9-14-18	JAMES H WHITE AND RITA FRANKS WHITE	TH EXPLORATION LLC	1/8+	906 230	N/A	N/A	N/A
10*17731	I	9-14-18	JAMES J MCGHEE AND JEANNINE CHAMBERS MCGHEE	TH EXPLORATION LLC	1/8+	914 519	N/A	N/A	N/A
10*17671	I	9-14-18	JAMES L STOUT	TH EXPLORATION LLC	1/8+	923 484	N/A	N/A	N/A
10*16882	I	9-14-18	JAMES LEROY AND DARLENE DOBBS OWENS	TH EXPLORATION LLC	1/8+	924 190	N/A	N/A	N/A
10*16569	I	9-14-18	JANICE C BALE	TH EXPLORATION LLC	1/8+	907 425	N/A	N/A	N/A
10*17503	I	9-14-18	JANICE L KUHN	TH EXPLORATION LLC	1/8+	924 122	N/A	N/A	N/A
10*16950	I	9-14-18	JAY E AND CECILIA E LEWTON	TH EXPLORATION LLC	1/8+	924 134	N/A	N/A	N/A
10*16532	I	9-14-18	JEAN ANN MCFADDEN	TH EXPLORATION LLC	1/8+	906 459	N/A	N/A	N/A
10*16285	I	9-14-18	JOHN A SHUTZ AND CYNTHIA J SHUTZ	TH EXPLORATION LLC	1/8+	906 291	N/A	N/A	N/A
10*16483	I	9-14-18	JOHN C AND BARBARA H WINTER	TH EXPLORATION LLC	1/8+	924 178	N/A	N/A	N/A
10*16966	I	9-14-18	JOHN GILLETTE AND BARBARA GILLETTE	TH EXPLORATION LLC	1/8+	913 377	N/A	N/A	N/A
10*17885	I	9-14-18	JOHN RUSSELL BECKER	TH EXPLORATION, LLC	1/8+	924 540	N/A	N/A	N/A
10*17582	I	9-14-18	JOHN THOMAS ERAZMUS AND JEAN R ERAZMUS	TH EXPLORATION LLC	1/8+	924 124	N/A	N/A	N/A
10*16030	I	9-14-18	JOSEPH F CHMIELEWSKI AND SANDRA CHMIELEWSKI	TH EXPLORATION LLC	1/8+	906 264	N/A	N/A	N/A
10*47051.325.1	I	9-14-18	JUDITH A LEWANDOSKY AND ALAN E LEWANDOSKY	TH EXPLORATION LLC	1/8+	906 225	N/A	N/A	N/A
10*16993	I	9-14-18	JULIA HOOVER	TH EXPLORATION LLC	1/8+	924 150	N/A	N/A	N/A
10*17517	I	9-14-18	JULIO ENRIQUE & DEBRA K TORRES	TH EXPLORATION, LLC	1/8+	923 537	N/A	N/A	N/A
10*16085	I	9-14-18	KATHARYN ANNETTE LILLY LAING AND FREDDIE JOE LAING	TH EXPLORATION LLC	1/8+	912 43	N/A	N/A	N/A
10*16086	I	9-14-18	KATHARYN DAY LILLY	TH EXPLORATION LLC	1/8+	906 272	N/A	N/A	N/A
10*16531	I	9-14-18	KATHY DOBBS WELLS	TH EXPLORATION LLC	1/8+	906 472	N/A	N/A	N/A
10*17668	I	9-14-18	KENNETH R DOBBS	TH EXPLORATION, LLC	1/8+	923 503	N/A	N/A	N/A
10*16537	I	9-14-18	KIMI D BOWEN AND MADONNA M BOWEN	TH EXPLORATION LLC	1/8+	907 415	N/A	N/A	N/A
10*15752	I	9-14-18	KIM O CHAMBERS AND DEBRA CHAMBERS	TH EXPLORATION LLC	1/8+	906 258	N/A	N/A	N/A
10*16180	I	9-14-18	LARRY L CHAMBERS	TH EXPLORATION LLC	1/8+	906 280	N/A	N/A	N/A
10*17131	I	9-14-18	LAURA E TOTTEN AND LONNIE R TOTTEN	TH EXPLORATION LLC	1/8+	924 154	N/A	N/A	N/A
10*16726	I	9-14-18	LESLY K WHITE	TH EXPLORATION LLC	1/8+	924 182	N/A	N/A	N/A
10*16576	I	9-14-18	LINDA A MINER AND MICHAEL W MINER	TH EXPLORATION LLC	1/8+	907 484	N/A	N/A	N/A
10*16992	I	9-14-18	LINDA C ABRAHAM	TH EXPLORATION LLC	1/8+	924 148	N/A	N/A	N/A
10*17520	I	9-14-18	LUCY P SULLIVAN	TH EXPLORATION LLC	1/8+	923 533	N/A	N/A	N/A
10*17559	I	9-14-18	MARVIN JERRY BLAKE AND LINDA D BLAKE	TH EXPLORATION LLC	1/8+	923 528	N/A	N/A	N/A
10*16087	I	9-14-18	MARY PENILOPE LILLY MURPHY	TH EXPLORATION LLC	1/8+	912 41	N/A	N/A	N/A
10*17516	I	9-14-18	MARY V DOBBS	TH EXPLORATION LLC	1/8+	923 539	N/A	N/A	N/A

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10*17505	1	9-14-18	MICHAEL R & LEANNE DOBBS	TH EXPLORATION, LLC	1/8+	924 116	N/A	N/A	N/A
10*47051.325.3	1	9-14-18	NICHOLAS D PAVLIK AND GLORIA K PAVLIK	TH EXPLORATION, LLC	1/8+	906 228	N/A	N/A	N/A
10*16181	1	9-14-18	NORMA CHRISTINE WHIPP AND GERALD WAYNE BLACK	TH EXPLORATION, LLC	1/8+	906 281	N/A	N/A	N/A
10*16144	1	9-14-18	PATTIE S MADRID	TH EXPLORATION, LLC	1/8+	906 278	N/A	N/A	N/A
10*17580	1	9-14-18	PAUL CRAIG CUNNINGHAM	TH EXPLORATION, LLC	1/8+	923 530	N/A	N/A	N/A
10*17615	1	9-14-18	PAULA JO WRIGHT	TH EXPLORATION, LLC	1/8+	923 482	N/A	N/A	N/A
10*17581	1	9-14-18	PAULA WEIRES	TH EXPLORATION, LLC	1/8+	923 486	N/A	N/A	N/A
10*47051.325.8	1	9-14-18	RICK PAVLIK	TH EXPLORATION, LLC	1/8+	906 239	N/A	N/A	N/A
10*16570	1	9-14-18	ROBERT D BOWEN AND MARCIA M R BOWEN	TH EXPLORATION, LLC	1/8+	907 420	N/A	N/A	N/A
10*17878	1	9-14-18	ROBERT E & SARAH M ROUSH	TH EXPLORATION, LLC	1/8+	924 590	N/A	N/A	N/A
10*17413	1	9-14-18	ROBERT M CHAMBERS AND CHARLOTTE A CHAMBERS	TH EXPLORATION, LLC	1/8+	924 160	N/A	N/A	N/A
10*17129	1	9-14-18	ROBERTA JANE PARKINSON	TH EXPLORATION, LLC	1/8+	924 142	N/A	N/A	N/A
10*17700	1	9-14-18	ROGER L & MARILYN L GARRISON	TH EXPLORATION, LLC	1/8+	923 472	N/A	N/A	N/A
10*17616	1	9-14-18	RONALD & ELIZABETH DOBBS	TH EXPLORATION, LLC	1/8+	924 107	N/A	N/A	N/A
10*15477	1	9-14-18	RONALD A WYCINSKI	TH EXPLORATION, LLC	1/8+	906 241	N/A	N/A	N/A
10*16680	1	9-14-18	RONALD J AND JENNIFER CHAMBERS FICCA	TH EXPLORATION, LLC	1/8+	924 186	N/A	N/A	N/A
10*16990	1	9-14-18	ROSEMARY H BEAVERS	TH EXPLORATION, LLC	1/8+	924 152	N/A	N/A	N/A
10*17664	1	9-14-18	RUDOLPH H PARSONS	TH EXPLORATION, LLC	1/8+	923 511	N/A	N/A	N/A
10*16952	1	9-14-18	RUSSELL D HERVEY	TH EXPLORATION, LLC	1/8+	924 132	N/A	N/A	N/A
10*47051.325.5	1	9-14-18	SAMUEL ALAN MCCORD AND WINIFRED A MCKEE	TH EXPLORATION, LLC	1/8+	906 232	N/A	N/A	N/A
10*16733	1	9-14-18	SARAH L BISHOP	TH EXPLORATION, LLC	1/8+	924 172	N/A	N/A	N/A
10*47051.325.7	1	9-14-18	SHERON JONES	TH EXPLORATION, LLC	1/8+	906 237	N/A	N/A	N/A
10*16533	1	9-14-18	SHIRLEY ANN DOBBS	TH EXPLORATION, LLC	1/8+	906 469	N/A	N/A	N/A
10*17703	1	9-14-18	SHIRLEY N COX	TH EXPLORATION, LLC	1/8+	923 498	N/A	N/A	N/A
10*16949	1	9-14-18	STEVEN R AND BRIANNE L UTT	TH EXPLORATION, LLC	1/8+	924 138	N/A	N/A	N/A
10*17701	1	9-14-18	SUE ANN WORD	TH EXPLORATION, LLC	1/8+	923 470	N/A	N/A	N/A
10*17702	1	9-14-18	TAMMY BETH RAMSEY	TH EXPLORATION, LLC	1/8+	925 500	N/A	N/A	N/A
10*16967	1	9-14-18	TARA JEANNE MINOR AND JENNIFER A KNAPP	TH EXPLORATION, LLC	1/8+	914 612	N/A	N/A	N/A
10*16534	1	9-14-18	TERRY LEE LASAVAGE	TH EXPLORATION, LLC	1/8+	906 443	N/A	N/A	N/A
10*17667	1	9-14-18	THOMAS BRIAN WARRICK	TH EXPLORATION, LLC	1/8+	923 509	N/A	N/A	N/A
10*47051.325.6	1	9-14-18	THOMAS O MCCORD	TH EXPLORATION, LLC	1/8+	906 235	N/A	N/A	N/A
10*47051.325.2	1	9-14-18	TIMMY LEE STOUT AND DOROTHY MARIE STOUT	TH EXPLORATION, LLC	1/8+	906 222	N/A	N/A	N/A
10*17560	1	9-14-18	TREVOR HOOKS	TH EXPLORATION, LLC	1/8+	924 110	N/A	N/A	N/A
10*17134	1	9-14-18	UNITED CHRISTIAN MISSIONARY SOCIETY	TH EXPLORATION, LLC	1/8+	924 144	N/A	N/A	N/A
10*17617	1	9-14-18	UNITED DISCIPLES OF CHRIST CHURCH	TH EXPLORATION, LLC	1/8+	924 129	N/A	N/A	N/A
10*17881	1	9-14-18	WAYLON L & ANGELA J MURPHEE	TH EXPLORATION, LLC	1/8+	924 555	N/A	N/A	N/A
10*16490	1	9-14-18	WILLIAM H AND MERRY C COTTON	TH EXPLORATION, LLC	1/8+	924 176	N/A	N/A	N/A
10*17767	1	9-14-18	WILLIAM K & LINDA J MERRITT	TH EXPLORATION, LLC	1/8+	923 474	N/A	N/A	N/A
10*16965	1	9-14-18	WILLIAM L WRIGHT AND CAROLINA WRIGHT	TH EXPLORATION, LLC	1/8+	914 524	N/A	N/A	N/A

RECEIVED
 Office of Oil and Gas
 FEB 6 2018
 WV Department of
 Environmental Protection

51-01947 mod

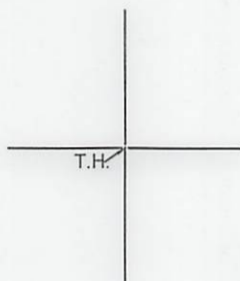
**HEAVEN HILL 3 LEASE
WELL 4HM
TUG HILL OPERATING**

7,451' T.H. 2,796' B.H.
T.H. LATITUDE 39°50'00"
B.H. LATITUDE 39°47'30"

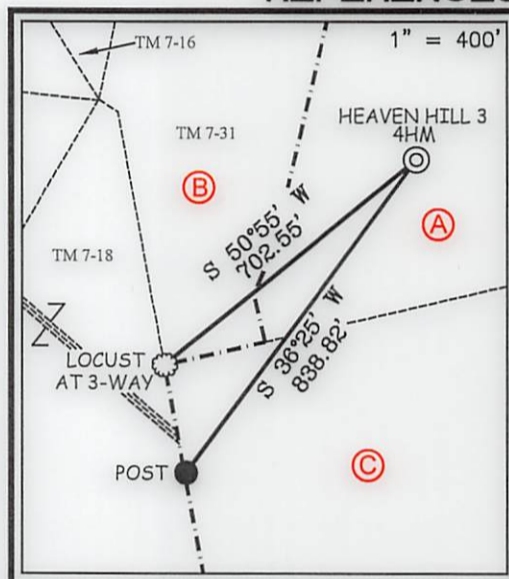
T.H. LONGITUDE 80°40'00"
B.H. LONGITUDE 80°40'00"

9,018' T.H.

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)		
NAD'83 S.P.C.(FT)	N. 478,850.79	E. 1,633,308.44
NAD'83 GEO.	LAT-(N) 39.808577	LONG-(W) 80.693191
NAD'83 UTM (M)	N. 4,406,556.46	E. 526,262.12
LANDING POINT		
NAD'83 S.P.C.(FT)	N. 477,098.0	E. 1,634,189.9
NAD'83 GEO.	LAT-(N) 39.803797	LONG-(W) 80.689971
NAD'83 UTM (M)	N. 4,406,026.9	E. 526,539.6
BOTTOM HOLE		
NAD'83 S.P.C.(FT)	N. 470,496.6	E. 1,637,855.5
NAD'83 GEO.	LAT-(N) 39.785808	LONG-(W) 80.676617
NAD'83 UTM (M)	N. 4,404,034.5	E. 527,689.9



REFERENCES

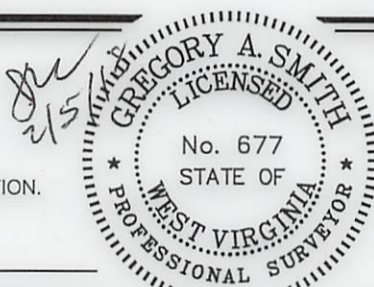


NOTES ON SURVEY

1. NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS ≥ 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.
2. WELL SPOT CIRCLE & TOPO MARK SCALE IS 1"=2000'



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 REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
DATE JUNE 30, 20 17
REVISED FEBRUARY 2, 20 18
OPERATORS WELL NO. HEAVEN HILL 3-4HM
API WELL NO. 47-051-01947
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8654P4HMR.dwg
HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

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

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

LOCATION: ELEVATION GROUND = 1,344.50' PROPOSED = 1,326.35' WATERSHED LOWER BOWMAN RUN OF FISH CREEK (HUC 10)

DISTRICT MEADE COUNTY MARSHALL QUADRANGLE GLEN EASTON 7.5'

SURFACE OWNER RICKY L. WHITLATCH ACREAGE 72.82±
ROYALTY OWNER RICKY L. WHITLATCH, ET AL - SEE WW-6A1 ACREAGE 72.82±

PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON CLEAN OUT AND REPLUG OTHER

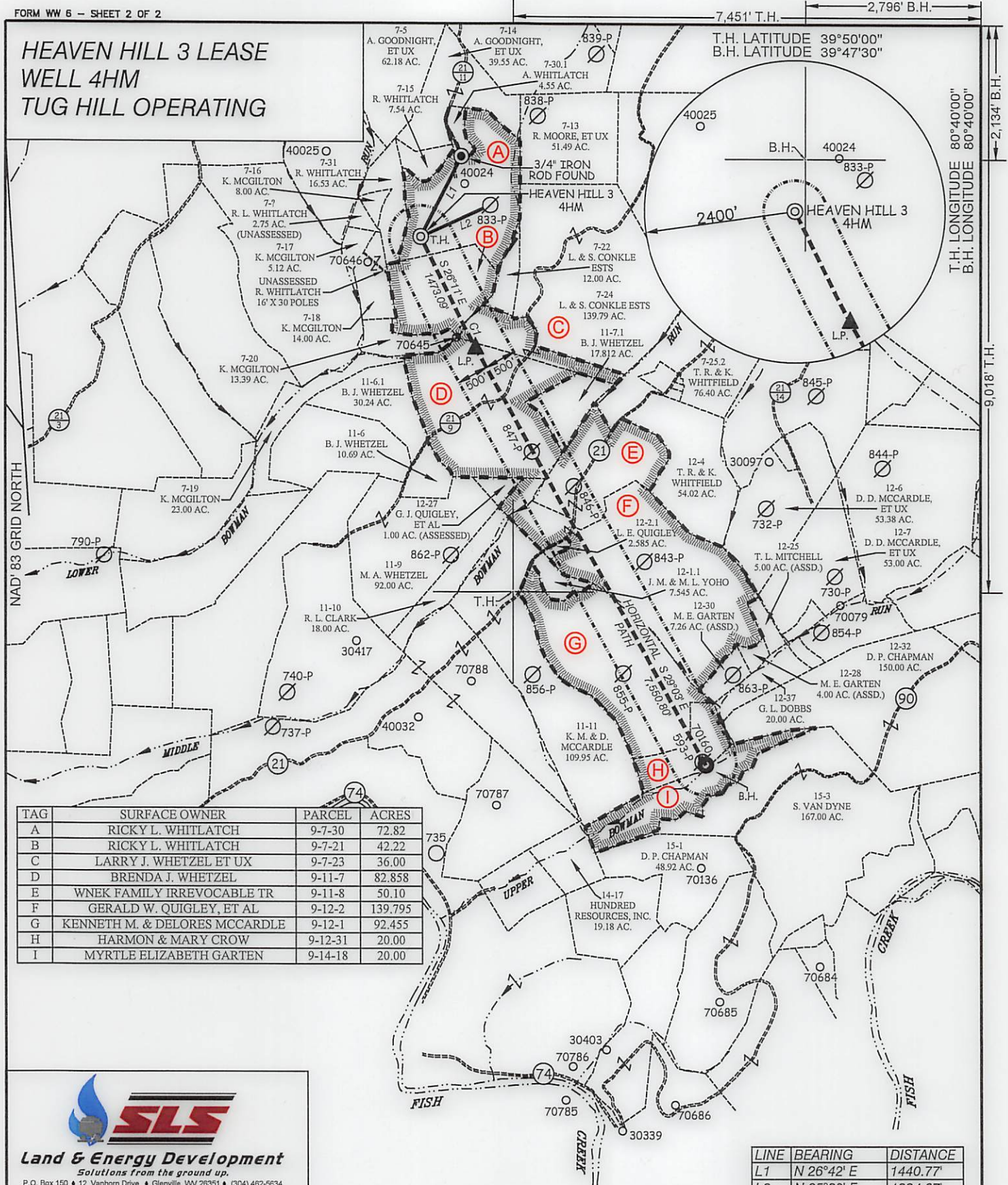
PHYSICAL CHANGE IN WELL (SPECIFY) _____ TARGET FORMATION MARCELLUS
ESTIMATED DEPTH TVD: 6,876' / TMD: 14,895'

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

COUNTY NAME PERMIT

03/02/2018

**HEAVEN HILL 3 LEASE
WELL 4HM
TUG HILL OPERATING**



TAG	SURFACE OWNER	PARCEL	ACRES
A	RICKY L. WHITLATCH	9-7-30	72.82
B	RICKY L. WHITLATCH	9-7-21	42.22
C	LARRY J. WHETZEL ET UX	9-7-23	36.00
D	BRENDA J. WHETZEL	9-11-7	82.858
E	WNEK FAMILY IRREVOCABLE TR	9-11-8	50.10
F	GERALD W. QUIGLEY, ET AL	9-12-2	139.795
G	KENNETH M. & DELORES MCCARDLE	9-12-1	92.455
H	HARMON & MARY CROW	9-12-31	20.00
I	MYRTLE ELIZABETH GARTEN	9-14-18	20.00

SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 • 12 Vanhorn Drive • Glenville, WV 26031 • (304) 462-5634
www.slsurveys.com

LINE	BEARING	DISTANCE
L1	N 26°42' E	1440.77'
L2	N 65°30' E	1224.67'

CURVE	ARC LENGTH	RADIUS	CHORD BEARING	CHORD LENGTH
C1	489.16'	14875.34'	S 28°16' E	489.14'

P.S. 677
Gregory A. Smith



(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)
 NAD'83 S.P.C. (FT) N. 478,850.79 E. 1,633,308.44
 NAD'83 GEO. LAT-(N) 39.808577 LONG-(W) 80.693191
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(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

SCALE 1" = 2000' FILE NO. 8654P4HMR.dwg
 DATE JUNE 30, 20 17
 REVISED FEBRUARY 2, 20 18
 OPERATORS WELL NO. HEAVEN HILL 3-4HM
 API WELL NO. 47 - 051 - 01947
 NO. STATE COUNTY PERMIT

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

LEGEND

- LEASE LINE
- SURFACE LINE
- WELL LATERAL
- OFFSET LINE
- TIE LINE
- CREEK
- ROAD
- COUNTY ROUTE
- PROPOSED WELL
- EXISTING WELL
- PERMITTED WELL
- TAX MAP-PARCEL
- LEASE # (SEE WW-6A1)
- SURFACE OWNER (SEE TABLE)

00-00
A

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

T.H. LATITUDE 39°50'00"
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