



west virginia department of environmental protection

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

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

Thursday, May 03, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

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

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

Lateral Extension

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 Modification Issued: May 3, 2018

Promoting a healthy environment.

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 Lane CR 21/11

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

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

(b) If Gas Shallow x Deep
Horizontal X

6) Existing Pad: Yes or No Yes

JW
2/28/18

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

10) Proposed Total Measured Depth: 17,812'

11) Proposed Horizontal Leg Length: 10,410'

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 X 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.

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18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	NEW	BW	BW	120'	120'	259FT^3(CTS)
Fresh Water	13 3/8"	NEW	H40	48#	1,120'	1,120'	1128ft^3(CTS)
Coal	13 3/8"	NEW	H40	48#	1,120'	1,120'	1128ft^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#	2,802'	2,802'	918ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	17,812'	17,812'	4549ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#		7,263'	
Liners							

Handwritten signature/initials
3/28/18

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							

PACKERS

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

WW-6B
(10/14)

API NO. 47-051 - 01947 MOD

OPERATOR WELL NO. Heaven Hill 3-4HM

Well Pad Name: Heaven Hill 3

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3/28/18

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 26,052,000 lb prop and approximately 402,365 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

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.

WW-6B Attachment to #24

Conductor, Coal and Fresh Water Casing Cement:

Premium NE-1 + 2% CaCl

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

Intermediate Casing:

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

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

Kick Off Plug:

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

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

Production Casing Cement:

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

Tail: *Premium NE-1 + .1% bwoc ASA-301 + 60lb/sk ASCA-1 + .35% bwoc BA-10A + .25% bwoc MPA-170, 44 lb sack + .5% bwoc R-3 + .75 gals/100sk FP-13L*

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

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Tug Hill Operating, LLC Casing and Cement Program

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"	2,802'	CTS
Production	5 1/2"	P110	8 7/8 x 8 3/4"	17,812'	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 NAME: Heaven Hill 3-4HM
STATE: West Virginia **COUNTY:** Marshall
DISTRICT: Meade
DF Elev: 1,326' **GL Elev:** 1,326'
TD: 17,812'
TH Latitude: 39.80857655
TH Longitude: -80.69319108
BH Latitude: 39.77893089
BH Longitude: -80.6715141

30" Csg @
120' MD / 120' TVD

13 3/8" Csg @
1,120' MD / 1,120' TVD

9 5/8" Csg @
2,802' MD / 2,800' TVD

KOP @ 6,763' ft MD

Pilot-Hole-
PH TD @
6,876' TVD

FORMATION TOPS	Depth TVD
Deepest Fresh Water	1038
Sewickley Coal	946
Pittsburgh Coal	1031
Big Lime	2060
Weir	2486
Berea	2684
Gordon	2946
Rhinestreet	6068
Genesee/Burkett	6586
Tully	6617
Hamilton	6650
Marcellus	6724
Landing Depth	6800
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	2,802'	2,800'	36	J55	Surface
Production	8 7/8 x 3/4	5 1/2	17,812'	6,982'	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	
896	A	15	Air	1 Centralizer every other jt	
4,014	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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Lateral TD @ 17,812' ft
6,982 MD ft TVD

SI-01947M00

Landing Point @ 7,402' MD / 6,800' TVD
PH TD = 100' below Onondaga Top

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51-01947MOD

Well: Heaven Hill 3-4 HM (I)
Site: Heaven Hill 3
Project: Marshall County, West Virginia
Design: rev6

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/S	+E/W	Dleg	T/Face	V/Sect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1300.00	3.00	140.00	1300.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2'100" build
3	1450.00	3.00	140.00	1449.93	-3.01	2.52	2.00	140.00	3.86	KOP Begin 2'100" build
4	3002.20	3.00	140.00	3000.00	-66.24	54.74	2.00	13.62	83.77	Begin 2'100" build/turn
5	4111.94	25.12	152.09	4069.92	-286.57	185.29	2.00	13.62	351.13	Begin 25.12" tangent
6	6763.03	89.00	150.24	6470.27	-1293.12	712.02	0.00	0.00	1476.05	Begin 10'100" build/turn
7	7401.95	89.00	150.24	6800.00	-1737.26	960.33	0.00	-2.07	1984.87	Begin 89.00" lateral section
8	17812.45	89.00	150.24	6982.00	-10773.22	6127.20	0.00	0.00	2393.75	PBHLTD 17812.44 MD/6982.00 TVD

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

System Datum: Mean Sea Level
 Depth Reference: RKB=1326+26 @ 1352.00usft

Northing: 14457177.31
 Easting: 1726578.31
 Longitude: -80.69319108
 Latitude: 39.60857655

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.92°

Azimuths to Grid North
 True North: -0.20°
 Magnetic North: -8.92°
 Magnetic Field
 Strength: 52086.45nT
 Dip Angle: 66.91°
 Date: 3/16/2018
 Model: IGRF2015

30" Casing @ 120 TVD
 13.38" Casing @ 1060 TVD
 KOP Begin 2'100" build
 Begin 3.00" tangent
 9.58" Casing @ 2800 TVD
 Begin 2'100" build/turn
 Begin 25.12" tangent
 Begin 10'100" build/turn
 Begin 89.00" lateral section
 Heaven Hill 3-4 HM LP 50E r6
 Heaven Hill 3-4 HM LP r3
 PBHLTD 17812.44 MD/6982.00 TVD
 Heaven Hill 3-4 HM BHL r6

West(-)/East(+) (2500 usft/m)
 South(-)/North(+) (2500 usft/m)

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13:52, March 15 2018



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 3-4 HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1326+26 @ 1352.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1326+26 @ 1352.00usft
Site:	Heaven Hill 3	North Reference:	Grid
Well:	Heaven Hill 3-4 HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev6		

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 (I)					
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	3/16/2018	-8.72	66.91	52,096.42746381

Design	rev6			
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	150.37

Plan Survey Tool Program	Date	3/15/2018		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	17,812.45 rev6 (Original Hole)	MWD	MWD - Standard

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 (°)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,450.00	3.00	140.00	1,449.93	-3.01	2.52	2.00	2.00	0.00	140.00	
3,002.20	3.00	140.00	3,000.00	-65.24	54.74	0.00	0.00	0.00	0.00	
4,111.94	25.12	152.09	4,069.92	-298.57	185.29	2.00	1.99	1.09	13.62	
6,763.03	25.12	152.09	6,470.27	-1,293.12	712.02	0.00	0.00	0.00	0.00	
7,401.95	89.00	150.24	6,800.00	-1,737.26	960.33	10.00	10.00	-0.29	-2.07	Heaven Hill 3-4 HM L
17,812.45	89.00	150.24	6,982.00	-10,773.22	6,127.20	0.00	0.00	0.00	0.00	Heaven Hill 3-4 HM B

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51-01947400



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 3-4 HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1326+26 @ 1352.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1326+26 @ 1352.00usft
Site:	Heaven Hill 3	North Reference:	Grid
Well:	Heaven Hill 3-4 HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev6		

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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	
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	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	14,457,177.31	1,726,578.31	39.80857655	-80.69319108	
KOP Begin 2°/100' build										
1,400.00	2.00	140.00	1,399.98	-1.34	1.12	14,457,175.98	1,726,579.43	39.80857287	-80.69318710	
1,450.00	3.00	140.00	1,449.93	-3.01	2.52	14,457,174.31	1,726,580.84	39.80856827	-80.69318213	
Begin 3.00° tangent										
1,500.00	3.00	140.00	1,499.86	-5.01	4.21	14,457,172.30	1,726,582.52	39.80856275	-80.69317617	
1,600.00	3.00	140.00	1,599.72	-9.02	7.57	14,457,168.29	1,726,585.88	39.80855171	-80.69316424	
1,700.00	3.00	140.00	1,699.59	-13.03	10.93	14,457,164.28	1,726,589.25	39.80854066	-80.69315231	
1,800.00	3.00	140.00	1,799.45	-17.04	14.30	14,457,160.27	1,726,592.61	39.80852962	-80.69314038	
1,900.00	3.00	140.00	1,899.31	-21.05	17.66	14,457,156.26	1,726,595.97	39.80851858	-80.69312845	
2,000.00	3.00	140.00	1,999.17	-25.06	21.03	14,457,152.26	1,726,599.34	39.80850754	-80.69311652	
2,100.00	3.00	140.00	2,099.04	-29.07	24.39	14,457,148.25	1,726,602.70	39.80849650	-80.69310459	
2,200.00	3.00	140.00	2,198.90	-33.08	27.75	14,457,144.24	1,726,606.07	39.80848546	-80.69309266	
2,300.00	3.00	140.00	2,298.76	-37.09	31.12	14,457,140.23	1,726,609.43	39.80847441	-80.69308073	
2,400.00	3.00	140.00	2,398.62	-41.09	34.48	14,457,136.22	1,726,612.80	39.80846337	-80.69306880	
2,500.00	3.00	140.00	2,498.49	-45.10	37.85	14,457,132.21	1,726,616.16	39.80845233	-80.69305687	
2,599.99	3.00	140.00	2,598.35	-49.11	41.21	14,457,128.20	1,726,619.52	39.80844129	-80.69304494	
2,699.99	3.00	140.00	2,698.21	-53.12	44.57	14,457,124.19	1,726,622.89	39.80843025	-80.69303301	
2,799.99	3.00	140.00	2,798.08	-57.13	47.94	14,457,120.18	1,726,626.25	39.80841920	-80.69302108	
2,899.99	3.00	140.00	2,897.94	-61.14	51.30	14,457,116.17	1,726,629.62	39.80840816	-80.69300915	
2,999.99	3.00	140.00	2,997.80	-65.15	54.67	14,457,112.16	1,726,632.98	39.80839712	-80.69299722	
3,002.20	3.00	140.00	3,000.00	-65.24	54.74	14,457,112.08	1,726,633.05	39.80839688	-80.69299696	
Begin 2°/100' build/turn										
3,099.99	4.92	145.37	3,097.56	-70.65	58.77	14,457,106.66	1,726,637.08	39.80838197	-80.69298267	
3,199.99	6.91	147.76	3,197.02	-79.27	64.42	14,457,098.04	1,726,642.73	39.80835825	-80.69296267	
3,299.99	8.90	149.09	3,296.07	-90.99	71.60	14,457,086.32	1,726,649.91	39.80832599	-80.69293724	
3,399.99	10.89	149.93	3,394.57	-105.81	80.31	14,457,071.50	1,726,658.62	39.80828522	-80.69290641	
3,499.99	12.89	150.51	3,492.42	-123.70	90.54	14,457,053.61	1,726,668.85	39.80823599	-80.69287021	
3,599.99	14.89	150.94	3,589.49	-144.64	102.27	14,457,032.67	1,726,680.58	39.80817837	-80.69282869	
3,699.99	16.89	151.27	3,685.67	-168.61	115.49	14,457,008.70	1,726,693.80	39.80811242	-80.69278191	
3,799.99	18.88	151.54	3,780.83	-195.57	130.18	14,456,981.74	1,726,708.50	39.80803823	-80.69272991	
3,899.99	20.88	151.75	3,874.86	-225.50	146.34	14,456,951.81	1,726,724.65	39.80795589	-80.69267277	
3,999.99	22.88	151.93	3,967.66	-258.36	163.92	14,456,918.95	1,726,742.24	39.80786549	-80.69261054	
4,099.99	24.88	152.08	4,059.09	-294.11	182.93	14,456,883.21	1,726,761.24	39.80776714	-80.69254332	
4,111.94	25.12	152.09	4,069.92	-298.57	185.29	14,456,878.74	1,726,763.60	39.80775486	-80.69253495	
Begin 25.12° tangent										
4,199.99	25.12	152.09	4,149.64	-331.60	202.78	14,456,845.71	1,726,781.10	39.80766398	-80.69247306	
4,299.99	25.12	152.09	4,240.18	-369.12	222.65	14,456,808.20	1,726,800.97	39.80756077	-80.69240278	
4,399.99	25.12	152.09	4,330.72	-406.63	242.52	14,456,770.68	1,726,820.83	39.80745756	-80.69233249	
4,499.99	25.12	152.09	4,421.27	-444.15	262.39	14,456,733.17	1,726,840.70	39.80735435	-80.69226220	
4,599.99	25.12	152.09	4,511.81	-481.66	282.26	14,456,695.65	1,726,860.57	39.80725113	-80.69219191	

SI-01947MOD



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 3-4 HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1326+26 @ 1352.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1326+26 @ 1352.00usft
Site:	Heaven Hill 3	North Reference:	Grid
Well:	Heaven Hill 3-4 HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev6		

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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	
4,699.99	25.12	152.09	4,602.35	-519.17	302.13	14,456,658.14	1,726,880.44	39.80714792	-80.69212163	
4,799.99	25.12	152.09	4,692.89	-556.69	322.00	14,456,620.62	1,726,900.31	39.80704471	-80.69205134	
4,899.99	25.12	152.09	4,783.43	-594.20	341.86	14,456,583.11	1,726,920.18	39.80694150	-80.69198105	
4,999.99	25.12	152.09	4,873.98	-631.72	361.73	14,456,545.59	1,726,940.04	39.80683828	-80.69191077	
5,099.99	25.12	152.09	4,964.52	-669.23	381.60	14,456,508.08	1,726,959.91	39.80673507	-80.69184048	
5,199.99	25.12	152.09	5,055.06	-706.75	401.47	14,456,470.56	1,726,979.78	39.80663186	-80.69177019	
5,299.99	25.12	152.09	5,145.60	-744.26	421.34	14,456,433.05	1,726,999.65	39.80652865	-80.69169991	
5,399.99	25.12	152.09	5,236.14	-781.78	441.21	14,456,395.53	1,727,019.52	39.80642543	-80.69162962	
5,499.99	25.12	152.09	5,326.69	-819.29	461.07	14,456,358.02	1,727,039.39	39.80632222	-80.69155934	
5,599.99	25.12	152.09	5,417.23	-856.81	480.94	14,456,320.51	1,727,059.26	39.80621901	-80.69148905	
5,699.99	25.12	152.09	5,507.77	-894.32	500.81	14,456,282.99	1,727,079.12	39.80611579	-80.69141877	
5,799.99	25.12	152.09	5,598.31	-931.84	520.68	14,456,245.48	1,727,098.99	39.80601258	-80.69134848	
5,899.99	25.12	152.09	5,688.85	-969.35	540.55	14,456,207.96	1,727,118.86	39.80590937	-80.69127820	
5,999.99	25.12	152.09	5,779.40	-1,006.87	560.42	14,456,170.45	1,727,138.73	39.80580615	-80.69120791	
6,099.99	25.12	152.09	5,869.94	-1,044.38	580.29	14,456,132.93	1,727,158.60	39.80570294	-80.69113763	
6,199.99	25.12	152.09	5,960.48	-1,081.90	600.15	14,456,095.42	1,727,178.47	39.80559973	-80.69106735	
6,299.99	25.12	152.09	6,051.02	-1,119.41	620.02	14,456,057.90	1,727,198.34	39.80549652	-80.69099706	
6,399.99	25.12	152.09	6,141.56	-1,156.93	639.89	14,456,020.39	1,727,218.20	39.80539330	-80.69092678	
6,499.99	25.12	152.09	6,232.11	-1,194.44	659.76	14,455,982.87	1,727,238.07	39.80529009	-80.69085650	
6,599.99	25.12	152.09	6,322.65	-1,231.96	679.63	14,455,945.36	1,727,257.94	39.80518688	-80.69078621	
6,699.99	25.12	152.09	6,413.19	-1,269.47	699.50	14,455,907.84	1,727,277.81	39.80508366	-80.69071593	
6,763.03	25.12	152.09	6,470.27	-1,293.12	712.02	14,455,884.19	1,727,290.34	39.80501859	-80.69067162	
Begin 10°/100' build/tum										
6,799.99	28.81	151.82	6,503.20	-1,307.91	719.90	14,455,869.40	1,727,298.22	39.80497791	-80.69064374	
6,899.99	38.81	151.31	6,586.18	-1,356.76	746.39	14,455,820.55	1,727,324.71	39.80484349	-80.69055002	
6,999.99	48.81	150.99	6,658.26	-1,417.31	779.77	14,455,760.00	1,727,358.08	39.80467689	-80.69043194	
7,099.99	58.81	150.75	6,717.23	-1,487.72	819.01	14,455,689.60	1,727,397.32	39.80448317	-80.69029308	
7,199.99	68.80	150.56	6,761.32	-1,565.83	862.93	14,455,611.48	1,727,441.24	39.80426823	-80.69013767	
7,299.99	78.80	150.40	6,789.18	-1,649.29	910.19	14,455,528.03	1,727,488.50	39.80403859	-80.68997042	
7,399.99	88.80	150.24	6,799.96	-1,735.55	959.35	14,455,441.76	1,727,537.67	39.80380123	-80.68979643	
7,401.95	89.00	150.24	6,800.00	-1,737.25	960.33	14,455,440.06	1,727,538.64	39.80379653	-80.68979298	
Begin 89.00° lateral section										
7,499.99	89.00	150.24	6,801.71	-1,822.35	1,008.98	14,455,354.97	1,727,587.30	39.80356239	-80.68962079	
7,599.98	89.00	150.24	6,803.46	-1,909.14	1,058.62	14,455,268.17	1,727,636.93	39.80332355	-80.68944515	
7,699.98	89.00	150.24	6,805.21	-1,995.94	1,108.25	14,455,181.37	1,727,686.56	39.80308471	-80.68926950	
7,799.98	89.00	150.24	6,806.96	-2,082.74	1,157.88	14,455,094.58	1,727,736.19	39.80284587	-80.68909386	
7,899.98	89.00	150.24	6,808.71	-2,169.53	1,207.51	14,455,007.78	1,727,785.82	39.80260704	-80.68891823	
7,999.98	89.00	150.24	6,810.46	-2,256.33	1,257.14	14,454,920.98	1,727,835.45	39.80236820	-80.68874259	
8,099.98	89.00	150.24	6,812.20	-2,343.13	1,306.77	14,454,834.19	1,727,885.09	39.80212936	-80.68856695	
8,199.98	89.00	150.24	6,813.95	-2,429.92	1,356.40	14,454,747.39	1,727,934.72	39.80189052	-80.68839132	
8,299.98	89.00	150.24	6,815.70	-2,516.72	1,406.04	14,454,660.59	1,727,984.35	39.80165168	-80.68821568	
8,399.98	89.00	150.24	6,817.45	-2,603.51	1,455.67	14,454,573.80	1,728,033.98	39.80141284	-80.68804005	
8,499.98	89.00	150.24	6,819.20	-2,690.31	1,505.30	14,454,487.00	1,728,083.61	39.80117400	-80.68786442	
8,599.98	89.00	150.24	6,820.94	-2,777.11	1,554.93	14,454,400.21	1,728,133.24	39.80093516	-80.68768879	
8,699.98	89.00	150.24	6,822.69	-2,863.90	1,604.56	14,454,313.41	1,728,182.87	39.80069632	-80.68751316	
8,799.98	89.00	150.24	6,824.44	-2,950.70	1,654.19	14,454,226.61	1,728,232.50	39.80045748	-80.68733753	
8,899.98	89.00	150.24	6,826.19	-3,037.50	1,703.82	14,454,139.82	1,728,282.14	39.80021864	-80.68716191	
8,999.98	89.00	150.24	6,827.94	-3,124.29	1,753.45	14,454,053.02	1,728,331.77	39.79997980	-80.68698628	
9,099.98	89.00	150.24	6,829.69	-3,211.09	1,803.09	14,453,966.22	1,728,381.40	39.79974096	-80.68681066	
9,199.98	89.00	150.24	6,831.43	-3,297.89	1,852.72	14,453,879.43	1,728,431.03	39.79950211	-80.68663504	
9,299.98	89.00	150.24	6,833.18	-3,384.68	1,902.35	14,453,792.63	1,728,480.66	39.79926327	-80.68645941	
9,399.98	89.00	150.24	6,834.93	-3,471.48	1,951.98	14,453,705.83	1,728,530.29	39.79902443	-80.68628379	
9,499.98	89.00	150.24	6,836.68	-3,558.28	2,001.61	14,453,619.04	1,728,579.92	39.79878559	-80.68610818	
9,599.98	89.00	150.24	6,838.43	-3,645.07	2,051.24	14,453,532.24	1,728,629.55	39.79854674	-80.68593256	



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 (I)
 Wellbore: Original Hole
 Design: rev6

Local Co-ordinate Reference: Well Heaven Hill 3-4 HM (I)
 TVD Reference: RKB=1326+26 @ 1352.00usft
 MD Reference: RKB=1326+26 @ 1352.00usft
 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
9,699.98	89.00	150.24	6,840.18	-3,731.87	2,100.87	14,453,445.44	1,728,679.19	39.79830790	-80.68575694
9,799.98	89.00	150.24	6,841.92	-3,818.67	2,150.50	14,453,358.65	1,728,728.82	39.79806906	-80.68558133
9,899.98	89.00	150.24	6,843.67	-3,905.46	2,200.14	14,453,271.85	1,728,778.45	39.79783021	-80.68540571
9,999.98	89.00	150.24	6,845.42	-3,992.26	2,249.77	14,453,185.05	1,728,828.08	39.79759137	-80.68523010
10,099.98	89.00	150.24	6,847.17	-4,079.06	2,299.40	14,453,098.26	1,728,877.71	39.79735253	-80.68505449
10,199.98	89.00	150.24	6,848.92	-4,165.85	2,349.03	14,453,011.46	1,728,927.34	39.79711368	-80.68487888
10,299.98	89.00	150.24	6,850.66	-4,252.65	2,398.66	14,452,924.66	1,728,976.97	39.79687484	-80.68470327
10,399.98	89.00	150.24	6,852.41	-4,339.45	2,448.29	14,452,837.87	1,729,026.61	39.79663599	-80.68452766
10,499.98	89.00	150.24	6,854.16	-4,426.24	2,497.92	14,452,751.07	1,729,076.24	39.79639715	-80.68435205
10,599.98	89.00	150.24	6,855.91	-4,513.04	2,547.56	14,452,664.27	1,729,125.87	39.79615830	-80.68417644
10,699.98	89.00	150.24	6,857.66	-4,599.83	2,597.19	14,452,577.48	1,729,175.50	39.79591945	-80.68400084
10,799.98	89.00	150.24	6,859.41	-4,686.63	2,646.82	14,452,490.68	1,729,225.13	39.79568061	-80.68382524
10,899.98	89.00	150.24	6,861.15	-4,773.43	2,696.45	14,452,403.89	1,729,274.76	39.79544176	-80.68364963
10,999.98	89.00	150.24	6,862.90	-4,860.22	2,746.08	14,452,317.09	1,729,324.39	39.79520292	-80.68347403
11,099.98	89.00	150.24	6,864.65	-4,947.02	2,795.71	14,452,230.29	1,729,374.02	39.79496407	-80.68329843
11,199.98	89.00	150.24	6,866.40	-5,033.82	2,845.34	14,452,143.50	1,729,423.66	39.79472522	-80.68312284
11,299.98	89.00	150.24	6,868.15	-5,120.61	2,894.97	14,452,056.70	1,729,473.29	39.79448637	-80.68294724
11,399.98	89.00	150.24	6,869.90	-5,207.41	2,944.61	14,451,969.90	1,729,522.92	39.79424753	-80.68277164
11,499.98	89.00	150.24	6,871.64	-5,294.21	2,994.24	14,451,883.11	1,729,572.55	39.79400868	-80.68259605
11,599.98	89.00	150.24	6,873.39	-5,381.00	3,043.87	14,451,796.31	1,729,622.18	39.79376983	-80.68242045
11,699.98	89.00	150.24	6,875.14	-5,467.80	3,093.50	14,451,709.51	1,729,671.81	39.79353098	-80.68224486
11,799.98	89.00	150.24	6,876.89	-5,554.60	3,143.13	14,451,622.72	1,729,721.44	39.79329213	-80.68206927
11,899.98	89.00	150.24	6,878.64	-5,641.39	3,192.76	14,451,535.92	1,729,771.07	39.79305328	-80.68189368
11,999.98	89.00	150.24	6,880.38	-5,728.19	3,242.39	14,451,449.12	1,729,820.71	39.79281443	-80.68171809
12,099.98	89.00	150.24	6,882.13	-5,814.99	3,292.02	14,451,362.33	1,729,870.34	39.79257558	-80.68154250
12,199.98	89.00	150.24	6,883.88	-5,901.78	3,341.66	14,451,275.53	1,729,919.97	39.79233673	-80.68136692
12,299.98	89.00	150.24	6,885.63	-5,988.58	3,391.29	14,451,188.73	1,729,969.60	39.79209788	-80.68119133
12,399.98	89.00	150.24	6,887.38	-6,075.38	3,440.92	14,451,101.94	1,730,019.23	39.79185903	-80.68101575
12,499.98	89.00	150.24	6,889.13	-6,162.17	3,490.55	14,451,015.14	1,730,068.86	39.79162018	-80.68084016
12,599.98	89.00	150.24	6,890.87	-6,248.97	3,540.18	14,450,928.34	1,730,118.49	39.79138133	-80.68066458
12,699.97	89.00	150.24	6,892.62	-6,335.77	3,589.81	14,450,841.55	1,730,168.13	39.79114248	-80.68048900
12,799.97	89.00	150.24	6,894.37	-6,422.56	3,639.44	14,450,754.75	1,730,217.76	39.79090363	-80.68031342
12,899.97	89.00	150.24	6,896.12	-6,509.36	3,689.08	14,450,667.95	1,730,267.39	39.79066478	-80.68013785
12,999.97	89.00	150.24	6,897.87	-6,596.16	3,738.71	14,450,581.16	1,730,317.02	39.79042593	-80.67996227
13,099.97	89.00	150.24	6,899.62	-6,682.95	3,788.34	14,450,494.36	1,730,366.65	39.79018707	-80.67978669
13,199.97	89.00	150.24	6,901.36	-6,769.75	3,837.97	14,450,407.56	1,730,416.28	39.78994822	-80.67961112
13,299.97	89.00	150.24	6,903.11	-6,856.54	3,887.60	14,450,320.77	1,730,465.91	39.78970937	-80.67943555
13,399.97	89.00	150.24	6,904.86	-6,943.34	3,937.23	14,450,233.97	1,730,515.54	39.78947051	-80.67925997
13,499.97	89.00	150.24	6,906.61	-7,030.14	3,986.86	14,450,147.18	1,730,565.18	39.78923166	-80.67908440
13,599.97	89.00	150.24	6,908.36	-7,116.93	4,036.49	14,450,060.38	1,730,614.81	39.78899281	-80.67890883
13,699.97	89.00	150.24	6,910.10	-7,203.73	4,086.13	14,449,973.58	1,730,664.44	39.78875395	-80.67873327
13,799.97	89.00	150.24	6,911.85	-7,290.53	4,135.76	14,449,886.79	1,730,714.07	39.78851510	-80.67855770
13,899.97	89.00	150.24	6,913.60	-7,377.32	4,185.39	14,449,799.99	1,730,763.70	39.78827624	-80.67838213
13,999.97	89.00	150.24	6,915.35	-7,464.12	4,235.02	14,449,713.19	1,730,813.33	39.78803739	-80.67820657
14,099.97	89.00	150.24	6,917.10	-7,550.92	4,284.65	14,449,626.40	1,730,862.96	39.78779853	-80.67803100
14,199.97	89.00	150.24	6,918.85	-7,637.71	4,334.28	14,449,539.60	1,730,912.59	39.78755968	-80.67785544
14,299.97	89.00	150.24	6,920.59	-7,724.51	4,383.91	14,449,452.80	1,730,962.23	39.78732082	-80.67767988
14,399.97	89.00	150.24	6,922.34	-7,811.31	4,433.54	14,449,366.01	1,731,011.86	39.78708197	-80.67750432
14,499.97	89.00	150.24	6,924.09	-7,898.10	4,483.18	14,449,279.21	1,731,061.49	39.78684311	-80.67732876
14,599.97	89.00	150.24	6,925.84	-7,984.90	4,532.81	14,449,192.41	1,731,111.12	39.78660426	-80.67715321
14,699.97	89.00	150.24	6,927.59	-8,071.70	4,582.44	14,449,105.62	1,731,160.75	39.78636540	-80.67697765
14,799.97	89.00	150.24	6,929.33	-8,158.49	4,632.07	14,449,018.82	1,731,210.38	39.78612654	-80.67680209
14,899.97	89.00	150.24	6,931.08	-8,245.29	4,681.70	14,448,932.02	1,731,260.01	39.78588768	-80.67662654
14,999.97	89.00	150.24	6,932.83	-8,332.09	4,731.33	14,448,845.23	1,731,309.65	39.78564883	-80.67645099
15,099.97	89.00	150.24	6,934.58	-8,418.88	4,780.96	14,448,758.43	1,731,359.28	39.78540997	-80.67627544



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 3-4 HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1326+26 @ 1352.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1326+26 @ 1352.00usft
Site:	Heaven Hill 3	North Reference:	Grid
Well:	Heaven Hill 3-4 HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev6		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
15,199.97	89.00	150.24	6,936.33	-8,505.68	4,830.60	14,448,671.63	1,731,408.91	39.78517111	-80.67609989	
15,299.97	89.00	150.24	6,938.08	-8,592.48	4,880.23	14,448,584.84	1,731,458.54	39.78493225	-80.67592434	
15,399.97	89.00	150.24	6,939.82	-8,679.27	4,929.86	14,448,498.04	1,731,508.17	39.78469339	-80.67574879	
15,499.97	89.00	150.24	6,941.57	-8,766.07	4,979.49	14,448,411.24	1,731,557.80	39.78445454	-80.67557324	
15,599.97	89.00	150.24	6,943.32	-8,852.87	5,029.12	14,448,324.45	1,731,607.43	39.78421568	-80.67539770	
15,699.97	89.00	150.24	6,945.07	-8,939.66	5,078.75	14,448,237.65	1,731,657.06	39.78397682	-80.67522215	
15,799.97	89.00	150.24	6,946.82	-9,026.46	5,128.38	14,448,150.86	1,731,706.70	39.78373796	-80.67504661	
15,899.97	89.00	150.24	6,948.57	-9,113.25	5,178.01	14,448,064.06	1,731,756.33	39.78349910	-80.67487107	
15,999.97	89.00	150.24	6,950.31	-9,200.05	5,227.65	14,447,977.26	1,731,805.96	39.78326024	-80.67469553	
16,099.97	89.00	150.24	6,952.06	-9,286.85	5,277.28	14,447,890.47	1,731,855.59	39.78302138	-80.67451999	
16,199.97	89.00	150.24	6,953.81	-9,373.64	5,326.91	14,447,803.67	1,731,905.22	39.78278252	-80.67434445	
16,299.97	89.00	150.24	6,955.56	-9,460.44	5,376.54	14,447,716.87	1,731,954.85	39.78254366	-80.67416892	
16,399.97	89.00	150.24	6,957.31	-9,547.24	5,426.17	14,447,630.08	1,732,004.48	39.78230479	-80.67399338	
16,499.97	89.00	150.24	6,959.05	-9,634.03	5,475.80	14,447,543.28	1,732,054.11	39.78206593	-80.67381785	
16,599.97	89.00	150.24	6,960.80	-9,720.83	5,525.43	14,447,456.48	1,732,103.75	39.78182707	-80.67364231	
16,699.97	89.00	150.24	6,962.55	-9,807.63	5,575.06	14,447,369.69	1,732,153.38	39.78158821	-80.67346678	
16,799.97	89.00	150.24	6,964.30	-9,894.42	5,624.70	14,447,282.89	1,732,203.01	39.78134935	-80.67329125	
16,899.97	89.00	150.24	6,966.05	-9,981.22	5,674.33	14,447,196.09	1,732,252.64	39.78111048	-80.67311572	
16,999.97	89.00	150.24	6,967.80	-10,068.02	5,723.96	14,447,109.30	1,732,302.27	39.78087162	-80.67294019	
17,099.97	89.00	150.24	6,969.54	-10,154.81	5,773.59	14,447,022.50	1,732,351.90	39.78063276	-80.67276466	
17,199.97	89.00	150.24	6,971.29	-10,241.61	5,823.22	14,446,935.70	1,732,401.53	39.78039389	-80.67258914	
17,299.97	89.00	150.24	6,973.04	-10,328.41	5,872.85	14,446,848.91	1,732,451.17	39.78015503	-80.67241361	
17,399.97	89.00	150.24	6,974.79	-10,415.20	5,922.48	14,446,762.11	1,732,500.80	39.77991617	-80.67223809	
17,499.97	89.00	150.24	6,976.54	-10,502.00	5,972.12	14,446,675.31	1,732,550.43	39.77967730	-80.67206257	
17,599.97	89.00	150.24	6,978.29	-10,588.80	6,021.75	14,446,588.52	1,732,600.06	39.77943844	-80.67188705	
17,699.96	89.00	150.24	6,980.03	-10,675.59	6,071.38	14,446,501.72	1,732,649.69	39.77919957	-80.67171153	
17,799.96	89.00	150.24	6,981.78	-10,762.39	6,121.01	14,446,414.92	1,732,699.32	39.77896071	-80.67153601	
17,812.44	89.00	150.24	6,982.00	-10,773.22	6,127.20	14,446,404.10	1,732,705.51	39.77893091	-80.67151411	
PBHL/TD 17812.44 MD/6982.00 TVD										
17,812.45	89.00	150.24	6,982.00	-10,773.22	6,127.20	14,446,404.09	1,732,705.52	39.77893089	-80.67151410	

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 - hit/miss target - Shape - Point	0.00	0.00	6,778.00	-1,737.26	910.33	14,455,440.06	1,727,488.64	39.80379700	-80.68997100	
- plan misses target center by 48.23usft at 7374.92usft MD (6798.89 TVD, -1713.81 N, 946.93 E)										
Heaven Hill 3-4 HM LP ε - plan hits target center - Point	0.00	0.00	6,800.00	-1,737.26	960.33	14,455,440.06	1,727,538.64	39.80379653	-80.68979298	
Heaven Hill 3-4 HM BHL - plan hits target center - Point	0.00	0.01	6,982.00	-10,773.22	6,127.20	14,446,404.09	1,732,705.52	39.77893089	-80.67151410	

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Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 3-4 HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1326+26 @ 1352.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1326+26 @ 1352.00usft
Site:	Heaven Hill 3	North Reference:	Grid
Well:	Heaven Hill 3-4 HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev6		

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	
2,801.92	2,800.00	9 5/8" Casing @ 2800 TVD	9-5/8	12-1/4	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
1,300.00	1,300.00	0.00	0.00	KOP Begin 2°/100' build	
1,450.00	1,449.93	-3.01	2.52	Begin 3.00° tangent	
3,002.20	3,000.00	-65.24	54.74	Begin 2°/100' build/turn	
4,111.94	4,069.92	-298.57	185.29	Begin 25.12° tangent	
6,763.03	6,470.27	-1,293.12	712.02	Begin 10°/100' build/turn	
7,401.95	6,800.00	-1,737.25	960.33	Begin 89.00° lateral section	
17,812.44	6,982.00	-10,773.22	6,127.20	PBHL/TD 17812.44 MD/6982.00 TVD	

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JW
3/28/18

Well Site Safety Plan

Tug Hill Operating, LLC

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

March 2018

WW-6A1
(5/13)

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

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

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

(1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;

(2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

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

*See Attached pages

**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

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

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

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

01-01947 MD

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*15746	C	9-7-23	BRUCE D SCHURR	TH EXPLORATION LLC	1/8+	921	N/A	N/A	N/A
10*16021	C	9-7-23	TOMMY BONAR AND TANYA S BONAR	TH EXPLORATION LLC	1/8+	925	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*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*17415	C	9-7-23	DILLON PITSENBARGER	TH EXPLORATION LLC	1/8+	919	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*47051.256.1	C	9-7-23	BRENDA J WHETZEL	TH EXPLORATION LLC	1/8+	881	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*47051.256.11	C	9-7-23	JOHN L MASON	TH EXPLORATION LLC	1/8+	905	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*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*47051.256.14	C	9-7-23	HUGH R BUZZARD	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*47051.256.16	C	9-7-23	CHARLOTTE B HUMMELL	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*47051.256.18	C	9-7-23	JOHN WILLIAM BONAR AND SHIRLEY BONAR	TH EXPLORATION LLC	1/8+	913	N/A	N/A	N/A
10*47051.256.19	C	9-7-23	MICHAEL DAVID PYLES AND CYNTHIA A PYLES	TH EXPLORATION LLC	1/8+	907	N/A	N/A	N/A
10*47051.256.20	C	9-7-23	JEFFREY THOMAS PYLES AND TERESA A PYLES	TH EXPLORATION LLC	1/8+	907	N/A	N/A	N/A
10*47051.256.21	C	9-7-23	JACK L MASON AND JEAN M MASON	TH EXPLORATION LLC	1/8+	904	N/A	N/A	N/A
10*47051.256.22	C	9-7-23	BEVERLY J HOPSON	TH EXPLORATION LLC	1/8+	913	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*47051.256.24	C	9-7-23	CATHERINE BONAR PETTIT BILLIE	TH EXPLORATION LLC	1/8+	904	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*47051.256.8	C	9-7-23	PAMELA ANN MASON	TH EXPLORATION LLC	1/8+	905	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*15746	D	9-11-7	BRUCE D SCHURR	TH EXPLORATION LLC	1/8+	921	N/A	N/A	N/A
10*16021	D	9-11-7	TOMMY BONAR AND TANYA S BONAR	TH EXPLORATION LLC	1/8+	925	N/A	N/A	N/A
10*16115	D	9-11-7	EARL W HARRIS	TH EXPLORATION LLC	1/8+	925	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*17415	D	9-11-7	DILLON PITSENBARGER	TH EXPLORATION LLC	1/8+	919	N/A	N/A	N/A
10*17506	D	9-11-7	CHASKIA F HARRIS AND JAMES M HARRIS	TH EXPLORATION LLC	1/8+	919	N/A	N/A	N/A
10*17507	D	9-11-7	DEZRAY METCALF	TH EXPLORATION LLC	1/8+	919	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*47051.256.10	D	9-11-7	GRACE LAURA BONAR	TH EXPLORATION LLC	1/8+	905	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*47051.256.12	D	9-11-7	STEVEN A BOHRER	TH EXPLORATION LLC	1/8+	905	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	N/A	N/A	N/A
10*47051.256.14	D	9-11-7	HUGH R BUZZARD	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A
10*47051.256.15	D	9-11-7	CHARLOTTE J BONAR YOHO	TH EXPLORATION LLC	1/8+	904	N/A	N/A	N/A
10*47051.256.16	D	9-11-7	CHARLOTTE B HUMMELL	TH EXPLORATION LLC	1/8+	905	N/A	N/A	N/A

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

51-01947400

Lease Name or No.	Tag	Parcel	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment
10*47051.256.17	D	9-11-7	MAXINE G JOHNSON	TH EXPLORATION LLC	1/8+	904 457	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+	913 522	N/A	N/A	N/A
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*47051.256.20	D	9-11-7	JEFFREY THOMAS PYLES AND TERESA A PYLES	TH EXPLORATION LLC	1/8+	907 209	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+	904 626	N/A	N/A	N/A
10*47051.256.22	D	9-11-7	BEVERLY J HOPSON	TH EXPLORATION LLC	1/8+	913 581	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*47051.256.24	D	9-11-7	CATHERINE BONAR PETTIT BILLIE	TH EXPLORATION LLC	1/8+	904 628	N/A	N/A	N/A
10*47051.256.7	D	9-11-7	MARILYN SUE BUMER	TH EXPLORATION LLC	1/8+	905 29	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*47051.256.9	D	9-11-7	WANDA MASON SUNSHINE	TH EXPLORATION LLC	1/8+	905 33	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*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*15482	E	9-11-8	SUSAN NELSON	TH EXPLORATION LLC	1/8+	908 203	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*15750	E	9-11-8	SANDRA K TRULL	TH EXPLORATION LLC	1/8+	908 229	N/A	N/A	N/A
10*16058	E	9-11-8	MATTIE RUTH JACKSON PRESCOTT	TH EXPLORATION LLC	1/8+	908 231	N/A	N/A	N/A
10*16118	E	9-11-8	RUBY RIDDLE JACKSON	TH EXPLORATION LLC	1/8+	908 233	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*16298	E	9-11-8	GEOFFREY A SHIEFER AND STEPHANIE L SCHIEFER	TH EXPLORATION LLC	1/8+	908 238	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*16414	E	9-11-8	MARY ELIZABETH DRIGGERS	TH EXPLORATION LLC	1/8+	908 208	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*16416	E	9-11-8	CYNTHIA HUDSON	TH EXPLORATION LLC	1/8+	908 219	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*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*16478	E	9-11-8	MARION L AND EMILY CAMPBELL	TH EXPLORATION LLC	1/8+	908 245	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*16515	E	9-11-8	ANNA MARIE JACKSON	TH EXPLORATION LLC	1/8+	908 251	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*16545	E	9-11-8	ROBERT G & ELLEN FOUNDS	TH EXPLORATION LLC	1/8+	908 260	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*16666	E	9-11-8	MICHAEL P PYLE	TH EXPLORATION LLC	1/8+	908 255	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*16668	E	9-11-8	JACK I AND MERRILEE PYLE	TH EXPLORATION LLC	1/8+	908 257	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*16686	E	9-11-8	CHERYLE M TRACEY	TH EXPLORATION LLC	1/8+	927 475	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*16689	E	9-11-8	JOHN C FOUNDS	TH EXPLORATION LLC	1/8+	927 490	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*16720	E	9-11-8	DONNA ELAINE BRASKETT	TH EXPLORATION LLC	1/8+	921 152	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*16747	E	9-11-8	WILLIAM DALE BRASKETT	TH EXPLORATION LLC	1/8+	921 96	N/A	N/A	N/A

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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
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*16802	E	9-11-8	CHRISTOPHER AND TAMMY RICHARDSON	TH EXPLORATION LLC	1/8+	921 495	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*16806	E	9-11-8	VIRGINIA I WHITMAN	TH EXPLORATION LLC	1/8+	921 528	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*16808	E	9-11-8	MICHAEL L ORTIZ	TH EXPLORATION LLC	1/8+	921 349	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*16819	E	9-11-8	TERESA ORTIZ BIGGS	TH EXPLORATION LLC	1/8+	921 147	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*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*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*16838	E	9-11-8	ROBERT G FUNARI	TH EXPLORATION LLC	1/8+	921 82	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*16863	E	9-11-8	TINA MOORE	TH EXPLORATION LLC	1/8+	921 334	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*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*16880	E	9-11-8	BEVERLY ANN STORTS	TH EXPLORATION LLC	1/8+	921 498	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*16962	E	9-11-8	DENNIS P AND BARBARA EZELL FLORY	TH EXPLORATION LLC	1/8+	921 70	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*16977	E	9-11-8	JEREMY COCHENOUR	TH EXPLORATION LLC	1/8+	921 102	N/A	N/A	N/A
10*16987	E	9-11-8	LAURIE EZELL PERRY	TH EXPLORATION LLC	1/8+	921 355	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*16991	E	9-11-8	MARYELLEN FOUNDS AND LAUREN FOUNDS	TH EXPLORATION LLC	1/8+	921 79	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*17130	E	9-11-8	CINDY L BARGER	TH EXPLORATION LLC	1/8+	921 137	N/A	N/A	N/A
10*17155	E	9-11-8	JESSE LEON JR AND TERESA GAIL EZELLE	TH EXPLORATION LLC	1/8+	921 118	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*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*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*17205	E	9-11-8	SANDRA JEAN WILSON	TH EXPLORATION LLC	1/8+	921 524	N/A	N/A	N/A
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*17274	E	9-11-8	DAVID H WILSON	TH EXPLORATION LLC	1/8+	921 474	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*17276	E	9-11-8	BERTHA EZELL WYATT	TH EXPLORATION LLC	1/8+	921 526	N/A	N/A	N/A
10*17278	E	9-11-8	MICHAEL L EZELLE	TH EXPLORATION LLC	1/8+	921 121	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*17377	E	9-11-8	MILTON HOWARD EZELLE JR AND ELIZABETH A EZELLE	TH EXPLORATION LLC	1/8+	921 123	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*17438	E	9-11-8	DENNIS M WILSON	TH EXPLORATION LLC	1/8+	921 476	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*17441	E	9-11-8	RALPH J WILSON	TH EXPLORATION LLC	1/8+	921 522	N/A	N/A	N/A

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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*17443	E	9-11-8	MICHELLE MORROW-BACK	TH EXPLORATION LLC	1/8+	921 337	N/A	N/A	N/A
10*17444	E	9-11-8	KELY FOUNDS CAMPBELL	TH EXPLORATION LLC	1/8+	921 99	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*17482	E	9-11-8	TERESA EZELLE RALYA AND DAVID L RALYA	TH EXPLORATION LLC	1/8+	927 487	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*17484	E	9-11-8	NELDA S JACKSON	TH EXPLORATION LLC	1/8+	921 330	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*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*17527	E	9-11-8	JAMES MICHAEL EZELL AND LUCILLE D EZELL	TH EXPLORATION LLC	1/8+	921 111	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*17554	E	9-11-8	MICHAEL T RANKIN	TH EXPLORATION LLC	1/8+	921 361	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*17564	E	9-11-8	JAMES R & TRACEY E NICKOLSON	TH EXPLORATION LLC	1/8+	921 340	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*17566	E	9-11-8	NATHAN P & BARBARA T ERDOSSY	TH EXPLORATION LLC	1/8+	921 108	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*17589	E	9-11-8	MARY CHRISTINE MCKENNA	TH EXPLORATION LLC	1/8+	921 332	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*17744	E	9-11-8	SAM PRESLEY EZELL	TH EXPLORATION LLC	1/8+	921 116	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*47051.223.10	E	9-11-8	ROBERT E GORBY	TH EXPLORATION LLC	1/8+	908 47	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*47051.223.12	E	9-11-8	ALICE GORBY MARTIN	TH EXPLORATION LLC	1/8+	908 52	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*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*47051.223.15	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*47051.223.16	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*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*47051.223.18	E	9-11-8	BRITNEY MENEAR	TH EXPLORATION LLC	1/8+	908 57	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*47051.223.20	E	9-11-8	BARBARA A BUZZARD	TH EXPLORATION LLC	1/8+	908 24	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*47051.223.22	E	9-11-8	SALLY COLE	TH EXPLORATION LLC	1/8+	908 74	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*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*47051.223.26	E	9-11-8	WENDY L SMARKE	TH EXPLORATION LLC	1/8+	908 69	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*47051.223.28	E	9-11-8	KAREN S GAST	TH EXPLORATION LLC	1/8+	908 150	N/A	N/A	N/A
10*47051.223.29	E	9-11-8	PATSY JO RAJU	TH EXPLORATION LLC	1/8+	908 155	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*47051.223.31	E	9-11-8	JANICE M GONTA GAVALIK	TH EXPLORATION LLC	1/8+	908 180	N/A	N/A	N/A

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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*47051.223.33	E	9-11-8	NANCY CIAFFAGLIONE HOUSLEY	TH EXPLORATION LLC	1/8+	908 185	N/A	N/A	N/A
10*47051.223.34	E	9-11-8	JOHN CIAFFAGLIONE	TH EXPLORATION LLC	1/8+	908 170	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*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*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*47051.223.7	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*47051.223.8	E	9-11-8	DAVID M WILSON	TH EXPLORATION LLC	1/8+	907 649	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*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*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*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	LESLIE 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*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*16149	G	9-12-1	THOMAS MICHAEL WALLACE	TH EXPLORATION LLC	1/8+	924 610	N/A	N/A	N/A
10*16244	G	9-12-1	EMILY ANN NICIFOROS	TH EXPLORATION LLC	1/8+	924 617	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*15603	H	9-12-31	HAYHURST COMPANY A FLORIDA PARTNERSHIP	CHESAPEAKE APPALACHIA LLC	1/8+	727 253	N/A	Chesapeake to Chevron: 30/461	Chevron to Tug Hill: 36/148
10*16149	H	9-12-31	THOMAS MICHAEL WALLACE	TH EXPLORATION LLC	1/8+	924 610	N/A	N/A	N/A
10*16244	H	9-12-31	EMILY ANN NICIFOROS	TH EXPLORATION LLC	1/8+	924 617	N/A	N/A	N/A
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*15477	I	9-14-18	RONALD A WYCINSKI	TH EXPLORATION LLC	1/8+	906 241	N/A	N/A	N/A
10*15730	I	9-14-18	FRANCES V CARPENTER	TH EXPLORATION LLC	1/8+	906 256	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*16017	I	9-14-18	FLOYD A MCFADDEN	TH EXPLORATION LLC	1/8+	906 260	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*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*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*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*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*16087	I	9-14-18	MARY PENELOPE LILLY MURPHY	TH EXPLORATION LLC	1/8+	912 41	N/A	N/A	N/A
10*16131	I	9-14-18	ERIC S DOBBS	TH EXPLORATION LLC	1/8+	902 68	N/A	N/A	N/A
10*16144	I	9-14-18	PATTIE S MADRID	TH EXPLORATION LLC	1/8+	906 278	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*16181	I	9-14-18	NORMA CHRISTINE WHIPP AND GERALD WAYNE BLACK	TH EXPLORATION LLC	1/8+	906 281	N/A	N/A	N/A
			FIRST CHRISTIAN CHURCH OF MOUNDSVILLE BY ROGER FRANCIS AND ROBERT						
10*16182	I	9-14-18	ALBERT TRUSTEES	TH EXPLORATION LLC	1/8+	906 283	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*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

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10*16240	I	9-14-18	BONNIE SUE PATTERSON SWISHER	TH EXPLORATION LLC	1/8+	906 289	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*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*16442	I	9-14-18	FRED T AND JERRY L CHAMBERS	TH EXPLORATION LLC	1/8+	924 174	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*16444	I	9-14-18	CATHERINE ELLEN CHAMBERS	TH EXPLORATION LLC	1/8+	924 623	N/A	N/A	N/A
10*16445	I	9-14-18	DOUGLAS C AND GWENDLYN D LEWTON	TH EXPLORATION LLC	1/8+	925 123	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*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*16490	I	9-14-18	WILLIAM H AND MERRY C COTTON	TH EXPLORATION LLC	1/8+	924 176	N/A	N/A	N/A
10*16511	I	9-14-18	DOUGLAS R BOWEN	TH EXPLORATION LLC	1/8+	906 475	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*16532	I	9-14-18	JEAN ANN MCFADDEN	TH EXPLORATION LLC	1/8+	906 459	N/A	N/A	N/A
10*16533	I	9-14-18	SHIRLEY ANN DOBBS	TH EXPLORATION LLC	1/8+	906 469	N/A	N/A	N/A
10*16534	I	9-14-18	TERRY LEE LASAVAGE	TH EXPLORATION LLC	1/8+	906 443	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*16537	I	9-14-18	KIM D BOWEN AND MADONNA M BOWEN	TH EXPLORATION LLC	1/8+	907 415	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*16569	I	9-14-18	JANICE C BALE	TH EXPLORATION LLC	1/8+	907 425	N/A	N/A	N/A
10*16570	I	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*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*16580	I	9-14-18	HAROLD C MCFADDEN	TH EXPLORATION LLC	1/8+	907 480	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*16582	I	9-14-18	DORA BROCK BRAMMER	TH EXPLORATION LLC	1/8+	907 429	N/A	N/A	N/A
10*16680	I	9-14-18	RONALD J AND JENNIFER CHAMBERS FICCA	TH EXPLORATION LLC	1/8+	924 186	N/A	N/A	N/A
10*16726	I	9-14-18	LESLEY K WHITE	TH EXPLORATION LLC	1/8+	924 182	N/A	N/A	N/A
10*16733	I	9-14-18	SARAH L BISHOP	TH EXPLORATION LLC	1/8+	924 172	N/A	N/A	N/A
10*16835	I	9-14-18	ERNEST CARL AUGUSTINE JR	TH EXPLORATION LLC	1/8+	924 188	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*16948	I	9-14-18	FREDERICK M LEWTON	TH EXPLORATION LLC	1/8+	924 136	N/A	N/A	N/A
10*16949	I	9-14-18	STEVEN R AND BRIANNE L UTT	TH EXPLORATION LLC	1/8+	924 138	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*16952	I	9-14-18	RUSSELL D HERVEY	TH EXPLORATION LLC	1/8+	924 132	N/A	N/A	N/A
10*16953	I	9-14-18	DONALD T AND JEAN K HOGAN	TH EXPLORATION LLC	1/8+	924 140	N/A	N/A	N/A
10*16965	I	9-14-18	WILLIAM L WRIGHT AND CAROLINA WRIGHT	TH EXPLORATION LLC	1/8+	914 524	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*16967	I	9-14-18	TARA JEANNE MINOR AND JENNIFER A KNAPP	TH EXPLORATION LLC	1/8+	914 612	N/A	N/A	N/A
10*16990	I	9-14-18	ROSEMARY H BEAVERS	TH EXPLORATION LLC	1/8+	924 152	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*16993	I	9-14-18	JULIA HOOVER	TH EXPLORATION LLC	1/8+	924 150	N/A	N/A	N/A
10*16995	I	9-14-18	DIANE ELSIE RAMSEY	TH EXPLORATION LLC	1/8+	924 146	N/A	N/A	N/A
10*17129	I	9-14-18	ROBERTA JANE PARKINSON	TH EXPLORATION LLC	1/8+	924 142	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

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10*17134	I	9-14-18	UNITED CHRISTIAN MISSIONARY SOCIETY	TH EXPLORATION LLC	1/8+	924 144	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*17209	I	9-14-18	GAYLE S SHANNON	TH EXPLORATION LLC	1/8+	924 168	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*17396	I	9-14-18	CHRISTINE L KIDD	TH EXPLORATION LLC	1/8+	924 158	N/A	N/A	N/A
10*17413	I	9-14-18	ROBERT M CHAMBERS AND CHARLOTTE A CHAMBERS	TH EXPLORATION LLC	1/8+	924 160	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*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*17452	I	9-14-18	ALAN H & MARY K DEGARMO	TH EXPLORATION LLC	1/8+	924 164	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*17503	I	9-14-18	JANICE L KUHN	TH EXPLORATION LLC	1/8+	924 122	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*17505	I	9-14-18	MICHAEL R & LEANNE DOBBS	TH EXPLORATION LLC	1/8+	924 116	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*17516	I	9-14-18	MARY V DOBBS	TH EXPLORATION LLC	1/8+	923 539	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*17520	I	9-14-18	LUCY P SULLIVAN	TH EXPLORATION LLC	1/8+	923 533	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*17555	I	9-14-18	AARON AND JANA K PARRY	TH EXPLORATION LLC	1/8+	924 113	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*17560	I	9-14-18	TREVOR HOOKS	TH EXPLORATION LLC	1/8+	924 110	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*17579	I	9-14-18	DON COFFIELD & GLENDA DOBBS	TH EXPLORATION LLC	1/8+	923 525	N/A	N/A	N/A
10*17580	I	9-14-18	PAUL CRAIG CUNNINGHAM	TH EXPLORATION LLC	1/8+	923 530	N/A	N/A	N/A
10*17581	I	9-14-18	PAULA WEIRES	TH EXPLORATION LLC	1/8+	923 486	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*17612	I	9-14-18	BEVERLY A LEDBETTER	TH EXPLORATION LLC	1/8+	923 480	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*17614	I	9-14-18	DAVID DOBBS	TH EXPLORATION LLC	1/8+	923 489	N/A	N/A	N/A
10*17615	I	9-14-18	PAULA JO WRIGHT	TH EXPLORATION LLC	1/8+	923 482	N/A	N/A	N/A
10*17616	I	9-14-18	RONALD & ELIZABETH DOBBS	TH EXPLORATION LLC	1/8+	924 107	N/A	N/A	N/A
10*17617	I	9-14-18	UNITED DISCIPLES OF CHRIST CHURCH	TH EXPLORATION LLC	1/8+	924 129	N/A	N/A	N/A
10*17664	I	9-14-18	RUDOLPH H PARSONS	TH EXPLORATION LLC	1/8+	923 511	N/A	N/A	N/A
10*17667	I	9-14-18	THOMAS BRIAN WARRICK	TH EXPLORATION LLC	1/8+	923 509	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*17671	I	9-14-18	JAMES L STOUT	TH EXPLORATION LLC	1/8+	923 484	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*17675	I	9-14-18	GREGORY D & CAROLYN J WIBLE	TH EXPLORATION LLC	1/8+	923 507	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*17700	I	9-14-18	ROGER L & MARILYN L GARRISON	TH EXPLORATION LLC	1/8+	923 472	N/A	N/A	N/A
10*17701	I	9-14-18	SUE ANN WORD	TH EXPLORATION LLC	1/8+	923 470	N/A	N/A	N/A
10*17702	I	9-14-18	TAMMY BETH RAMSEY	TH EXPLORATION LLC	1/8+	925 500	N/A	N/A	N/A
10*17703	I	9-14-18	SHIRLEY N COX	TH EXPLORATION LLC	1/8+	923 498	N/A	N/A	N/A

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10*17708	I	9-14-18	BETTY LOU NOBLE	TH EXPLORATION LLC	1/8+	923 127	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*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*17766	I	9-14-18	EDWARD S & NANCY A ROSENTHAL	TH EXPLORATION LLC	1/8+	923 495	N/A	N/A	N/A
10*17767	I	9-14-18	WILLIAM K & LINDA J MERRITT	TH EXPLORATION LLC	1/8+	923 474	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*17771	I	9-14-18	CHARLES AND LISA WARRICK	TH EXPLORATION LLC	1/8+	923 477	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*17878	I	9-14-18	ROBERT E & SARAH M ROUSH	TH EXPLORATION LLC	1/8+	924 590	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*17880	I	9-14-18	ANNA M WRIGHT	TH EXPLORATION LLC	1/8+	924 586	N/A	N/A	N/A
10*17881	I	9-14-18	WAYLON L & ANGELA J MURPHEE	TH EXPLORATION LLC	1/8+	924 555	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*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*47051.325.2	I	9-14-18	TIMMY LEE STOUT AND DOROTHY MARIE STOUT	TH EXPLORATION LLC	1/8+	906 222	N/A	N/A	N/A
10*47051.325.3	I	9-14-18	NICHOLAS D PAVLIK AND GLORIA K PAVLIK	TH EXPLORATION LLC	1/8+	906 228	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*47051.325.5	I	9-14-18	SAMUEL ALAN MCCORD AND WINIFRED A MCKEE	TH EXPLORATION LLC	1/8+	906 232	N/A	N/A	N/A
10*47051.325.6	I	9-14-18	THOMAS O MCCORD	TH EXPLORATION LLC	1/8+	906 235	N/A	N/A	N/A
10*47051.325.7	I	9-14-18	SHERRON JONES	TH EXPLORATION LLC	1/8+	906 237	N/A	N/A	N/A
10*47051.325.8	I	9-14-18	RICK PAVLIK	TH EXPLORATION LLC	1/8+	906 239	N/A	N/A	N/A
10*15752	J	9-15-3	KIM O CHAMBERS AND DEBRA CHAMBERS	TH EXPLORATION LLC	1/8+	906 258	N/A	N/A	N/A
10*16017	J	9-15-3	FLOYD A MCFADDEN	TH EXPLORATION LLC	1/8+	906 260	N/A	N/A	N/A
10*16018	J	9-15-3	BARBARA MCFADDEN ALBRIGHT	TH EXPLORATION LLC	1/8+	906 262	N/A	N/A	N/A
10*16144	J	9-15-3	PATTIE S MADRID	TH EXPLORATION LLC	1/8+	906 278	N/A	N/A	N/A
10*16180	J	9-15-3	LARRY L CHAMBERS	TH EXPLORATION LLC	1/8+	906 280	N/A	N/A	N/A
10*16181	J	9-15-3	NORMA CHRISTINE WHIPP AND GERALD WAYNE BLACK	TH EXPLORATION LLC	1/8+	906 281	N/A	N/A	N/A
			FIRST CHRISTIAN CHURCH OF MOUNDSVILLE BY ROGER FRANCIS AND ROBERT						
10*16182	J	9-15-3	ALBERT TRUSTEES	TH EXPLORATION LLC	1/8+	906 283	N/A	N/A	N/A
10*16239	J	9-15-3	ANGELA L OLDFIELD AND KENNETH W OLDFIELD	TH EXPLORATION LLC	1/8+	906 287	N/A	N/A	N/A
10*16285	J	9-15-3	JOHN A SHUTZ AND CYNTHIA J SHUTZ	TH EXPLORATION LLC	1/8+	906 291	N/A	N/A	N/A
10*16441	J	9-15-3	GEORGE FRANKLIN AND NANCY ANN REED	TH EXPLORATION LLC	1/8+	924 619	N/A	N/A	N/A
10*16442	J	9-15-3	FRED T AND JERRY L CHAMBERS	TH EXPLORATION LLC	1/8+	924 174	N/A	N/A	N/A
10*16443	J	9-15-3	BARBARA BROWN CHAMBERS	TH EXPLORATION LLC	1/8+	924 621	N/A	N/A	N/A
10*16444	J	9-15-3	CATHERINE ELLEN CHAMBERS	TH EXPLORATION LLC	1/8+	924 623	N/A	N/A	N/A
10*16445	J	9-15-3	DOUGLAS C AND GWENDLYN D LEWTON	TH EXPLORATION LLC	1/8+	925 123	N/A	N/A	N/A
10*16483	J	9-15-3	JOHN C AND BARBARA H WINTER	TH EXPLORATION LLC	1/8+	924 178	N/A	N/A	N/A
10*16486	J	9-15-3	DAVID ALAN WILKINSON AND PATRICIA LYNN WILKINSON	TH EXPLORATION LLC	1/8+	924 180	N/A	N/A	N/A
10*16490	J	9-15-3	WILLIAM H AND MERRY C COTTON	TH EXPLORATION LLC	1/8+	924 176	N/A	N/A	N/A
10*16498	J	9-15-3	SHELLY YEATER	TH EXPLORATION LLC	1/8+	925 283	N/A	N/A	N/A
10*16511	J	9-15-3	DOUGLAS R BOWEN	TH EXPLORATION LLC	1/8+	906 475	N/A	N/A	N/A
10*16532	J	9-15-3	JEAN ANN MCFADDEN	TH EXPLORATION LLC	1/8+	906 459	N/A	N/A	N/A
10*16534	J	9-15-3	TERRY LEE LASAVAGE	TH EXPLORATION LLC	1/8+	906 443	N/A	N/A	N/A

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10*16537	J	9-15-3	KIM D BOWEN AND MADONNA M BOWEN	TH EXPLORATION LLC	1/8+	907 415	N/A	N/A	N/A
10*16540	J	9-15-3	JAMES A WINTER AND CONNIE G WINTER	TH EXPLORATION LLC	1/8+	924 184	N/A	N/A	N/A
10*16569	J	9-15-3	JANICE C BALE	TH EXPLORATION LLC	1/8+	907 425	N/A	N/A	N/A
10*16570	J	9-15-3	ROBERT D BOWEN AND MARCIA M R BOWEN	TH EXPLORATION LLC	1/8+	907 420	N/A	N/A	N/A
10*16576	J	9-15-3	LINDA A MINER AND MICHAEL W MINER	TH EXPLORATION LLC	1/8+	907 484	N/A	N/A	N/A
10*16580	J	9-15-3	HAROLD C MCFADDEN	TH EXPLORATION LLC	1/8+	907 480	N/A	N/A	N/A
10*16581	J	9-15-3	HELEN L SCHILLING	TH EXPLORATION LLC	1/8+	907 489	N/A	N/A	N/A
10*16582	J	9-15-3	DORA BROCK BRAMMER	TH EXPLORATION LLC	1/8+	907 429	N/A	N/A	N/A
10*16680	J	9-15-3	RONALD J AND JENNIFER CHAMBERS FICCA	TH EXPLORATION LLC	1/8+	924 186	N/A	N/A	N/A
10*16726	J	9-15-3	LESLEY K WHITE	TH EXPLORATION LLC	1/8+	924 182	N/A	N/A	N/A
10*16733	J	9-15-3	SARAH L BISHOP	TH EXPLORATION LLC	1/8+	924 172	N/A	N/A	N/A
10*16835	J	9-15-3	ERNEST CARL AUGUSTINE JR	TH EXPLORATION LLC	1/8+	924 188	N/A	N/A	N/A
10*16948	J	9-15-3	FREDERICK M LEWTON	TH EXPLORATION LLC	1/8+	924 136	N/A	N/A	N/A
10*16949	J	9-15-3	STEVEN R AND BRIANNE L LUTT	TH EXPLORATION LLC	1/8+	924 138	N/A	N/A	N/A
10*16950	J	9-15-3	JAY E AND CECILIA E LEWTON	TH EXPLORATION LLC	1/8+	924 134	N/A	N/A	N/A
10*16952	J	9-15-3	RUSSELL D HERVEY	TH EXPLORATION LLC	1/8+	924 132	N/A	N/A	N/A
10*16953	J	9-15-3	DONALD T AND JEAN K HOGAN	TH EXPLORATION LLC	1/8+	924 140	N/A	N/A	N/A
10*16990	J	9-15-3	ROSEMARY H BEAVERS	TH EXPLORATION LLC	1/8+	924 152	N/A	N/A	N/A
10*16992	J	9-15-3	LINDA C ABRAHAM	TH EXPLORATION LLC	1/8+	924 148	N/A	N/A	N/A
10*16993	J	9-15-3	JULIA HOOVER	TH EXPLORATION LLC	1/8+	924 150	N/A	N/A	N/A
10*16995	J	9-15-3	DIANE ELSIE RAMSEY	TH EXPLORATION LLC	1/8+	924 146	N/A	N/A	N/A
10*17129	J	9-15-3	ROBERTA JANE PARKINSON	TH EXPLORATION LLC	1/8+	924 142	N/A	N/A	N/A
10*17131	J	9-15-3	LAURA E TOTTEN AND LONNIE R TOTTEN	TH EXPLORATION LLC	1/8+	924 154	N/A	N/A	N/A
10*17134	J	9-15-3	UNITED CHRISTIAN MISSIONARY SOCIETY	TH EXPLORATION LLC	1/8+	924 144	N/A	N/A	N/A
10*17209	J	9-15-3	GAYLE S SHANNON	TH EXPLORATION LLC	1/8+	924 168	N/A	N/A	N/A
10*17289	J	9-15-3	HAROLD R HUNT JR AND ELIZABETH A HUNT	TH EXPLORATION LLC	1/8+	924 170	N/A	N/A	N/A
10*17396	J	9-15-3	CHRISTINE L KIDD	TH EXPLORATION LLC	1/8+	924 158	N/A	N/A	N/A
10*17413	J	9-15-3	ROBERT M CHAMBERS AND CHARLOTTE A CHAMBERS	TH EXPLORATION LLC	1/8+	924 160	N/A	N/A	N/A
10*17436	J	9-15-3	ANDREW M HOOVER AND DINAH R HOOVER	TH EXPLORATION LLC	1/8+	924 156	N/A	N/A	N/A
10*17448	J	9-15-3	FREDERICK L HERVEY AND CATHY J HERVEY	TH EXPLORATION LLC	1/8+	924 162	N/A	N/A	N/A
10*17452	J	9-15-3	ALAN H & MARY K DEGARMO	TH EXPLORATION LLC	1/8+	924 164	N/A	N/A	N/A
10*17486	J	9-15-3	JOSELYN M KEELY	TH EXPLORATION LLC	1/8+	929 364	N/A	N/A	N/A
10*17487	J	9-15-3	DEBORAH R MOKOSH	TH EXPLORATION LLC	1/8+	924 166	N/A	N/A	N/A
10*17563	J	9-15-3	DONALD L WOOD	TH EXPLORATION LLC	1/8+	923 523	N/A	N/A	N/A
10*17617	J	9-15-3	UNITED DISCIPLES OF CHRIST CHURCH	TH EXPLORATION LLC	1/8+	924 129	N/A	N/A	N/A
10*17674	J	9-15-3	HOWARD L & BETH E WOOD	TH EXPLORATION LLC	1/8+	923 505	N/A	N/A	N/A
10*17675	J	9-15-3	GREGORY D & CAROLYN J WIBLE	TH EXPLORATION LLC	1/8+	923 507	N/A	N/A	N/A
10*17701	J	9-15-3	SUE ANN WORD	TH EXPLORATION LLC	1/8+	923 470	N/A	N/A	N/A
10*17702	J	9-15-3	TAMMY BETH RAMSEY	TH EXPLORATION LLC	1/8+	925 500	N/A	N/A	N/A
10*47051.325.1	J	9-15-3	JUDITH A LEWANDOSKY AND ALAN E LEWANDOSKY	TH EXPLORATION LLC	1/8+	906 705	N/A	N/A	N/A
10*47051.325.3	J	9-15-3	NICHOLAS D PAVLIK AND GLORIA K PAVLIK	TH EXPLORATION LLC	1/8+	906 228	N/A	N/A	N/A
10*47051.325.4	J	9-15-3	JAMES H WHITE AND RITA FRANKS WHITE	TH EXPLORATION LLC	1/8+	906 230	N/A	N/A	N/A

51-01947
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WW-6A1 Supplement

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

SI-01947
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Lease Name or No.	Tag	Parcel	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment
10*47051.325.5	J	9-15-3	SAMUEL ALAN MCCORD AND WINIFRED A MCKEE	TH EXPLORATION LLC	1/8+	906 232	N/A	N/A	N/A
10*47051.325.6	J	9-15-3	THOMAS O MCCORD	TH EXPLORATION LLC	1/8+	906 235	N/A	N/A	N/A
10*47051.325.7	J	9-15-3	SHERON JONES	TH EXPLORATION LLC	1/8+	906 237	N/A	N/A	N/A
10*47051.325.8	J	9-15-3	RICK PAVLIK	TH EXPLORATION LLC	1/8+	906 239	N/A	N/A	N/A

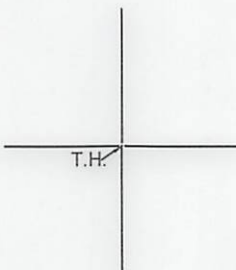
RECEIVED
Office of Oil and Gas
APR 3 2018
WV Department of
Environmental Protection

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

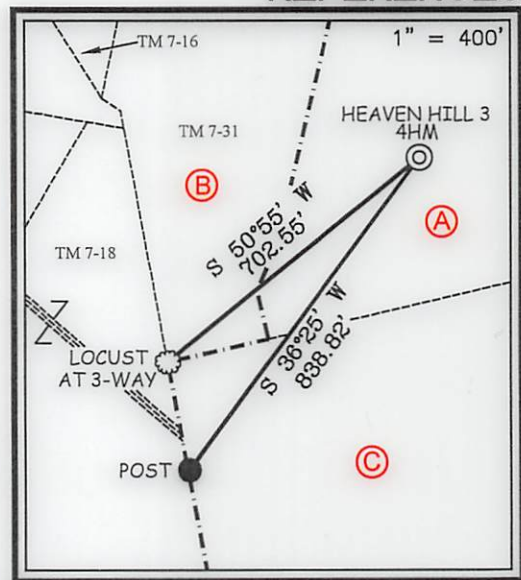
7,451' T.H. 1,362' B.H.
T.H. LATITUDE 39°50'00"
B.H. LATITUDE 39°47'30"

(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. 477,097.1	E. 1,634,240.0
NAD'83 GEO.	LAT-(N) 39.803797	LONG-(W) 80.689793
NAD'83 UTM (M)	N. 4,406,026.9	E. 526,554.8
BOTTOM HOLE		
NAD'83 S.P.C.(FT)	N. 467,973.0	E. 1,639,256.8
NAD'83 GEO.	LAT-(N) 39.778931	LONG-(W) 80.671514
NAD'83 UTM (M)	N. 4,403,272.8	E. 528,129.7

T.H. LONGITUDE 80°40'00"
B.H. LONGITUDE 80°40'00"
4,639' B.H.



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, 2018 & MARCH 22, 2018
OPERATORS WELL NO. HEAVEN HILL 3-4HM
API WELL NO. 47 - 051 - 01947
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8654P4HMR2.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: 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±
LEASE NO. SEE WW-6A1

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: 17,812'

WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DIANNA STAMPER CT CORPORATION SYSTEM
ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 FORT WORTH, TX 76107 ADDRESS 5400 D BIG TYLER ROAD CHARLESTON, WV 25313

COUNTY NAME PERMIT

HeA MOD



April 2, 2018

WVDEP Office of Oil & Gas
Attn: Laura Adkins
601 5th Street, SE
Charleston, WV 25304-2345

VIA: US MAIL

RE: Permit Application Modification Request for Heaven Hill 3-4HM (API # 47-051-01947)
Revised Directional Drilling Plan

Dear Laura:

Tug Hill Operating, LLC would like to submit the enclosed permit application modification request to our approved permit for the Heaven Hill 3-4HM.

Please find the following enclosed revisions for extending the bottom hole location of the well:

- Revised WW-6B with inspector signature
- Revised WW-6A1
- Revised Mylar Well Plat
- Revised Site Safety Plan

If you have any questions or concerns, please feel free to call me at 304-376-0111. Thank you for your consideration in this matter.

Sincerely,

Amy L. Miller
Permitting Specialist – Appalachia

alm
Enclosures