



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
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Jim Justice, Governor
Austin Caperton, Cabinet Secretary
www.dep.wv.gov

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 UNIT 2-4HM
47-051-01908-00-00

Revised Directional Drilling Plan

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 UNIT 2-4HM
Farm Name: CHARLES R. HAGEDORN, JR., ET UX
U.S. WELL NUMBER: 47-051-01908-00-00
Horizontal 6A / New Drill
Date Issued: 5/10/2017

Promoting a healthy environment.

05/12/2017

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 Unit 2-4HM Well Pad Name: Heaven Hill Unit 2

3) Farm Name/Surface Owner: Charles R. Hagedorn, Jr., et ux Public Road Access: Blake Ridge Rd (Co. Rt. 21/3)

4) Elevation, current ground: 1350' Elevation, proposed post-construction: 1331'

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

(b) If Gas Shallow X Deep _____
Horizontal X _____

6) Existing Pad: Yes or No No

JM
4/28/17

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus is the target formation at a depth of 6727' - 6779' thickness of 52' and anticipated pressure of approx. 3800 psi

8) Proposed Total Vertical Depth: 6,879'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 15,972'

11) Proposed Horizontal Leg Length: 8,650'

12) Approximate Fresh Water Strata Depths: 70', 1066'

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 - 969' and Pittsburgh Coal - 1059'

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 X

(a) If Yes, provide Mine Info: Name: Marshall County Coal Co. / Marshall County Mine
Depth: 1059' TVD and 291' 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	125'	120'	259FT^3(CTS)
Fresh Water	13 3/8"	NEW	H40	48#	1,130'	1,120'	1128ft^3(CTS)
Coal	13 3/8"	NEW	H40	48#	1,130'	1,120'	1128ft^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#	2,811'	2,801'	919ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	15,982'	15,972'	4215ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#	15,972'	6,417'	
Liners					9Pa		

Handwritten signature and date: Jy/28/17

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			

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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 21,625,000 lb proppant and 592,113 bbl of water. Max rate = 80 bpm; max psi = 9,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 32.98

22) Area to be disturbed for well pad only, less access road (acres): 4.57

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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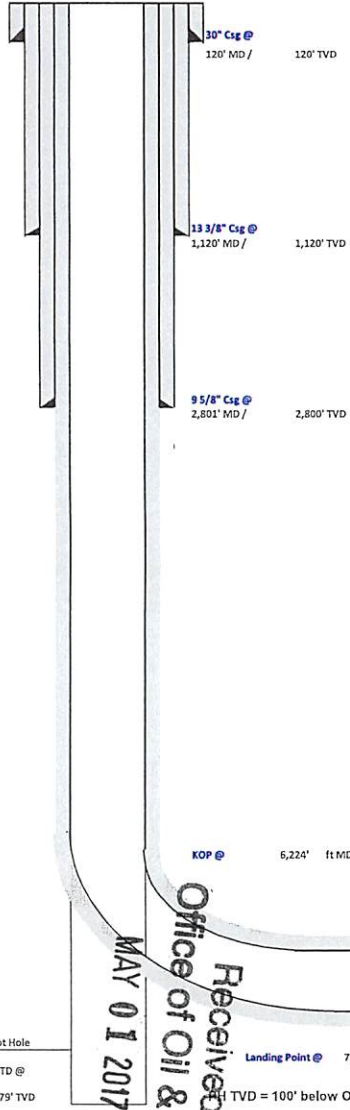
WELL NAME: **Heaven Hill 2-4HM**
 STATE: **West Virginia** COUNTY: **Marshall**
 DISTRICT: **Meade**
 DF Elev: **1,359'** GL Elev: **1,331'**
 TD: **15,972'**
 TH Latitude: **39.81001227**
 TH Longitude: **-80.71294905**
 BH Latitude: **39.787798**
 BH Longitude: **-80.699634**

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	1068
Sewickley Coal	969
Pittsburgh Coal	1059
Big Lime	2063
Weir	2489
Berea	2687
Gordon	2949
Rhlnestreet	6071
Genesee/Burkett	6615
Tully	6620
Hamilton	6653
Marcellus	6727
Landing Depth	6753
Onondaga	6779
Pilot Hole Depth	6879

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	2,801'	2,800'	36	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	15,972'	6,904'	20	P110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	338	A	15.6	Air	None
Surface	1,142	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	897	A	15	Air	1 Centralizer every other jt
Production	3,596	A	14.5	Air / SOBM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to stc

Handwritten signature and date: 4/28/17



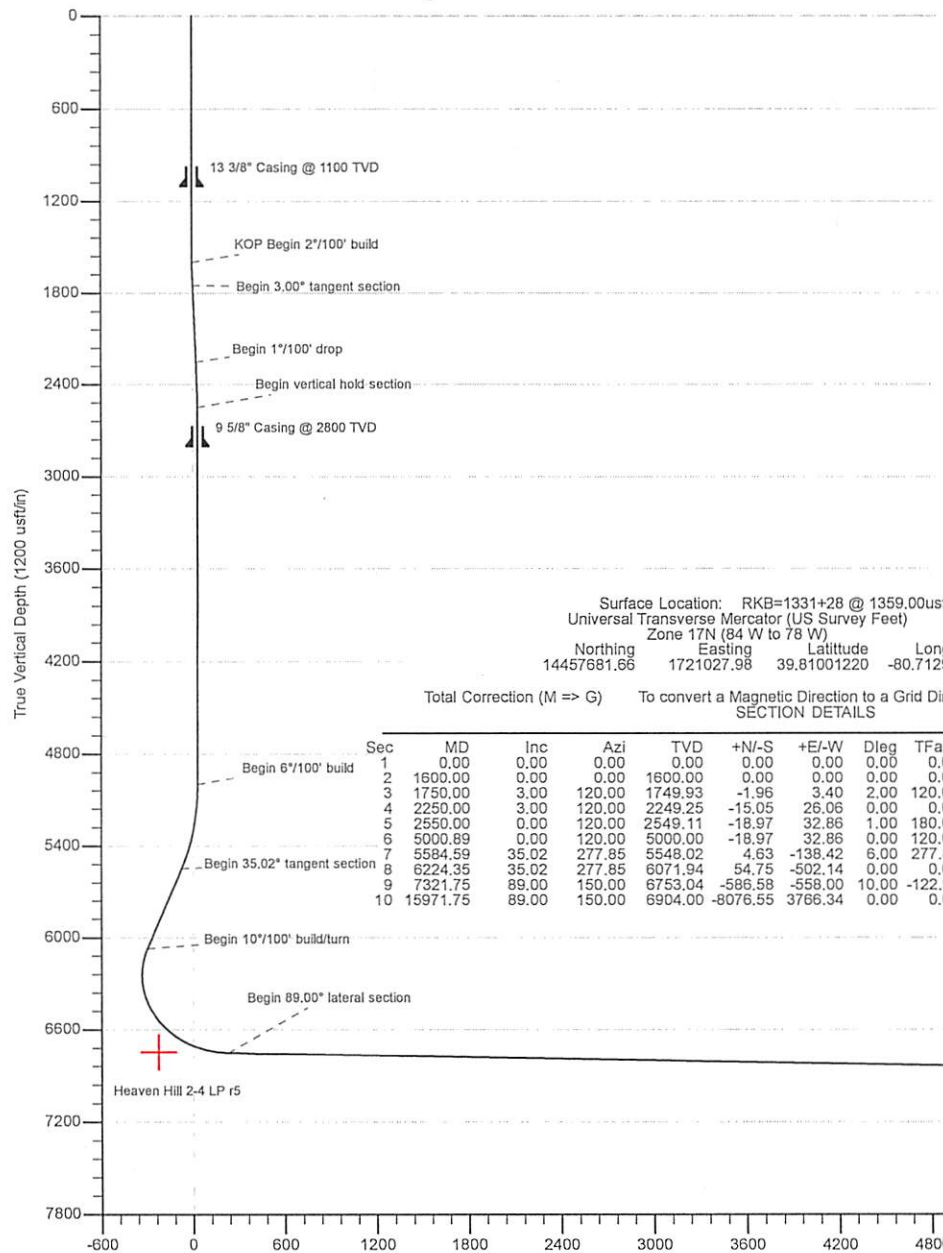
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Pilot Hole
 PH TD @ 6,879' TVD
 Landing Point @ 7,322' MD / 6,753' TVD
 TVD = 100' below Onondaga Top

Lateral TD @ 15,972' ft MD
 6,904' ft TVD



Tug Hill Operating LLC
Well: Heaven Hill 2-04 HM (slot F)
Site: Heaven Hill 2
Project: Marshall County, West Virginia
Design: rev7

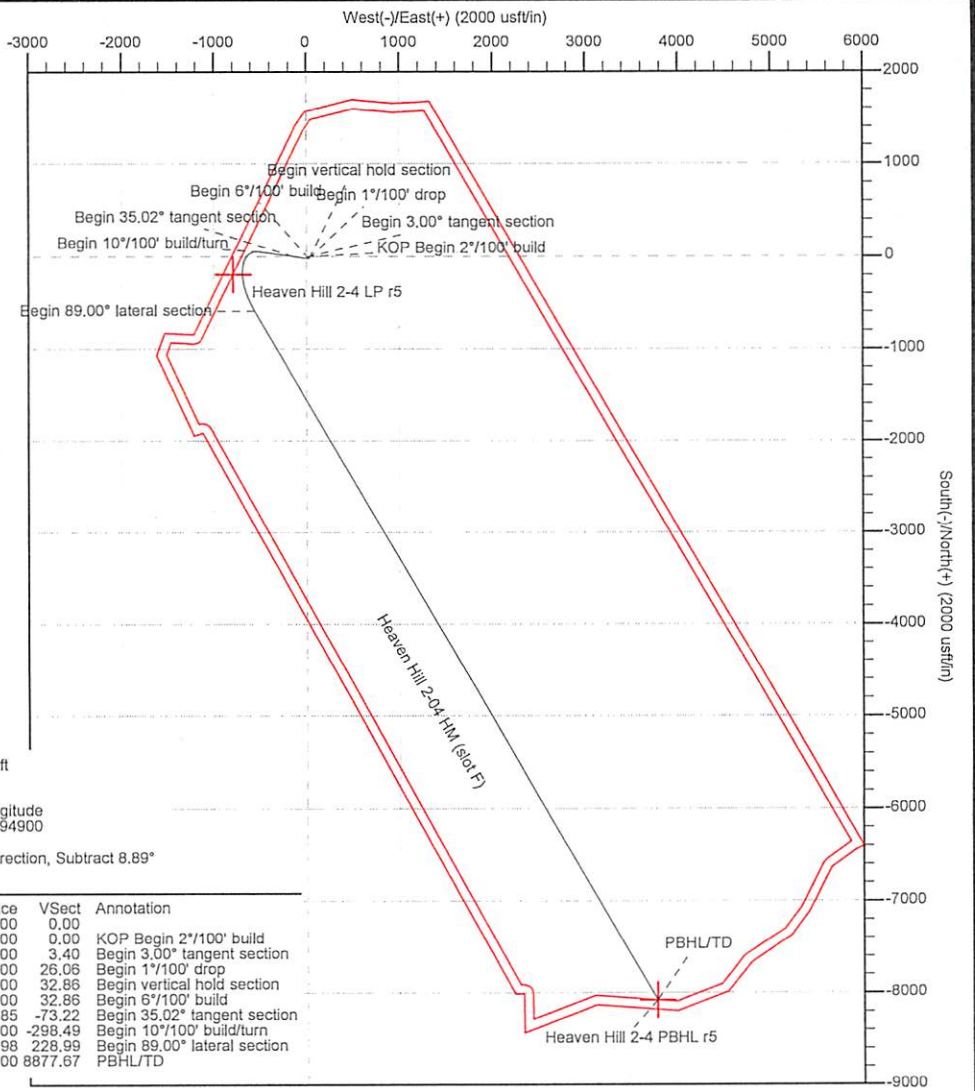


Surface Location: RKB=1331+28 @ 1359.00usft
 Universal Transverse Mercator (US Survey Feet)
 Zone 17N (84 W to 78 W)

Northing	Easting	Latitude	Longitude
14457681.66	1721027.98	39.81001220	-80.71294900

Total Correction (M => G) To convert a Magnetic Direction to a Grid Direction, Subtract 8.89°
 SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V Sect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1600.00	0.00	0.00	1600.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2"/100' build
3	1750.00	3.00	120.00	1749.93	-1.96	3.40	2.00	120.00	3.40	Begin 3.00° tangent section
4	2250.00	3.00	120.00	2249.25	-15.05	26.06	0.00	0.00	26.06	Begin 1"/100' drop
5	2550.00	0.00	120.00	2549.11	-18.97	32.86	1.00	180.00	32.86	Begin vertical hold section
6	5000.89	0.00	120.00	5000.00	-18.97	32.86	0.00	120.00	32.86	Begin 6"/100' build
7	5584.59	35.02	277.85	5548.02	4.63	-138.42	6.00	277.85	-73.22	Begin 35.02° tangent section
8	6224.35	35.02	277.85	6071.94	54.75	-502.14	0.00	0.00	-298.49	Begin 10"/100' build/turn
9	7321.75	89.00	150.00	6753.04	-586.58	-558.00	10.00	-122.98	228.99	Begin 89.00° lateral section
10	15971.75	89.00	150.00	6904.00	-8076.55	3766.34	0.00	0.00	8877.67	PBHL/TD



MTG
 Azimuths to Grid North
 True North: -0.18
 Magnetic North: -8.89

Magnetic Field
 Strength: 52355.2sn
 Dip Angle: 67.66
 Date: 11/9/2010
 Model: IGRF2010



Vertical Section at 150.00° (1200 usft/in)



Well Site Safety Plan

Tug Hill Operating, LLC

ju
4/28/17

Well Name: Heaven Hill Unit 2-4HM

Pad Name: Heaven Hill Unit 2

Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:
Northing: 4,406,710.18
Easting: 524,570.38

April 2017

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MAY 01 2017

05/12/2017



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 2-04 HM (slot F)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1331+28 @ 1359.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1331+28 @ 1359.00usft
Site:	Heaven Hill 2	North Reference:	Grid
Well:	Heaven Hill 2-04 HM (slot F)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev7		

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 2				
Site Position:		Northing:	14,457,660.30 usft	Latitude:	39.80995400
From:	Lat/Long	Easting:	1,720,974.97 usft	Longitude:	-80.71313800
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.18 °

Well	Heaven Hill 2-04 HM (slot F)					
Well Position	+N/-S	0.00 usft	Northing:	14,457,681.67 usft	Latitude:	39.81001220
	+E/-W	0.00 usft	Easting:	1,721,027.98 usft	Longitude:	-80.71294900
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	1,331.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/19/2016	-8.70	67.06	52,355.22561284

Design	rev7			
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	150.00

Plan Survey Tool Program	Date	4/13/2017		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	15,971.75 rev7 (Original Hole)	MWD MWD - Standard	



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 2-04 HM (slot F)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1331+28 @ 1359.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1331+28 @ 1359.00usft
Site:	Heaven Hill 2	North Reference:	Grid
Well:	Heaven Hill 2-04 HM (slot F)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev7		

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	
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,750.00	3.00	120.00	1,749.93	-1.96	3.40	2.00	2.00	0.00	120.00	
2,250.00	3.00	120.00	2,249.25	-15.05	26.06	0.00	0.00	0.00	0.00	
2,550.00	0.00	120.00	2,549.11	-18.97	32.86	1.00	-1.00	0.00	180.00	
5,000.89	0.00	120.00	5,000.00	-18.97	32.86	0.00	0.00	0.00	120.00	
5,584.59	35.02	277.85	5,548.02	4.63	-138.42	6.00	6.00	0.00	277.85	
6,224.35	35.02	277.85	6,071.94	54.75	-502.14	0.00	0.00	0.00	0.00	
7,321.75	89.00	150.00	6,753.04	-586.58	-558.00	10.00	4.92	-11.65	-122.98	
15,971.75	89.00	150.00	6,904.00	-8,076.55	3,766.34	0.00	0.00	0.00	0.00	Heaven Hill 2-4 PBHL



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 2-04 HM (slot F)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1331+28 @ 1359.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1331+28 @ 1359.00usft
Site:	Heaven Hill 2	North Reference:	Grid
Well:	Heaven Hill 2-04 HM (slot F)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev7		

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	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
100.00	0.00	0.00	100.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
200.00	0.00	0.00	200.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
300.00	0.00	0.00	300.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
400.00	0.00	0.00	400.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
500.00	0.00	0.00	500.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
600.00	0.00	0.00	600.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
700.00	0.00	0.00	700.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
800.00	0.00	0.00	800.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
900.00	0.00	0.00	900.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
1,300.00	0.00	0.00	1,300.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
1,400.00	0.00	0.00	1,400.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
1,500.00	0.00	0.00	1,500.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
1,600.00	0.00	0.00	1,600.00	0.00	0.00	14,457,681.67	1,721,027.98	39.81001220	-80.71294900
KOP Begin 2°/100' build									
1,700.00	2.00	120.00	1,699.98	-0.87	1.51	14,457,680.79	1,721,029.49	39.81000979	-80.71294363
1,750.00	3.00	120.00	1,749.93	-1.96	3.40	14,457,679.70	1,721,031.38	39.81000678	-80.71293692
Begin 3.00° tangent section									
1,800.00	3.00	120.00	1,799.86	-3.27	5.67	14,457,678.39	1,721,033.64	39.81000317	-80.71292886
1,900.00	3.00	120.00	1,899.73	-5.89	10.20	14,457,675.78	1,721,038.18	39.80999594	-80.71291275
2,000.00	3.00	120.00	1,999.59	-8.51	14.73	14,457,673.16	1,721,042.71	39.80998872	-80.71289664
2,100.00	3.00	120.00	2,099.45	-11.12	19.26	14,457,670.54	1,721,047.24	39.80998149	-80.71288053
2,200.00	3.00	120.00	2,199.31	-13.74	23.80	14,457,667.93	1,721,051.77	39.80997426	-80.71286442
2,250.00	3.00	120.00	2,249.25	-15.05	26.06	14,457,666.62	1,721,054.04	39.80997065	-80.71285637
Begin 1°/100' drop									
2,300.00	2.50	120.00	2,299.19	-16.25	28.14	14,457,665.42	1,721,056.12	39.80996734	-80.71284898
2,400.00	1.50	120.00	2,399.13	-17.99	31.16	14,457,663.67	1,721,059.14	39.80996252	-80.71283824
2,500.00	0.50	120.00	2,499.11	-18.86	32.67	14,457,662.80	1,721,060.65	39.80996011	-80.71283287
2,550.00	0.00	120.00	2,549.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
Begin vertical hold section									
2,600.00	0.00	0.00	2,599.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
2,700.00	0.00	0.00	2,699.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
2,800.00	0.00	0.00	2,799.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
2,900.00	0.00	0.00	2,899.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
3,000.00	0.00	0.00	2,999.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
3,100.00	0.00	0.00	3,099.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
3,200.00	0.00	0.00	3,199.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
3,300.00	0.00	0.00	3,299.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
3,400.00	0.00	0.00	3,399.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
3,500.00	0.00	0.00	3,499.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
3,600.00	0.00	0.00	3,599.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
3,700.00	0.00	0.00	3,699.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
3,800.00	0.00	0.00	3,799.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
3,900.00	0.00	0.00	3,899.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
4,000.00	0.00	0.00	3,999.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
4,100.00	0.00	0.00	4,099.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
4,200.00	0.00	0.00	4,199.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
4,300.00	0.00	0.00	4,299.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
4,400.00	0.00	0.00	4,399.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
4,500.00	0.00	0.00	4,499.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
4,600.00	0.00	0.00	4,599.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 2-04 HM (slot F)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1331+28 @ 1359.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1331+28 @ 1359.00usft
Site:	Heaven Hill 2	North Reference:	Grid
Well:	Heaven Hill 2-04 HM (slot F)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev7		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,700.00	0.00	0.00	4,699.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
4,800.00	0.00	0.00	4,799.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
4,900.00	0.00	0.00	4,899.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
5,000.00	0.00	0.00	4,999.11	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
5,000.89	0.00	0.00	5,000.00	-18.97	32.86	14,457,662.69	1,721,060.84	39.80995981	-80.71283220
Begin 6°/100' build									
5,100.00	5.95	277.85	5,098.93	-18.27	27.77	14,457,663.39	1,721,055.75	39.80996178	-80.71285032
5,200.00	11.95	277.85	5,197.67	-16.15	12.37	14,457,665.52	1,721,040.35	39.80996774	-80.71290512
5,300.00	17.95	277.85	5,294.24	-12.63	-13.17	14,457,669.03	1,721,014.81	39.80997763	-80.71299602
5,400.00	23.95	277.85	5,387.59	-7.75	-48.56	14,457,673.91	1,720,979.41	39.80999134	-80.71312202
5,500.00	29.95	277.85	5,476.69	-1.57	-93.44	14,457,680.10	1,720,934.54	39.81000872	-80.71328173
5,584.59	35.02	277.85	5,548.02	4.63	-138.42	14,457,686.30	1,720,889.55	39.81002614	-80.71344186
Begin 35.02° tangent section									
5,600.00	35.02	277.85	5,560.64	5.84	-147.19	14,457,687.50	1,720,880.79	39.81002953	-80.71347305
5,700.00	35.02	277.85	5,642.54	13.67	-204.04	14,457,695.34	1,720,823.94	39.81005155	-80.71367541
5,800.00	35.02	277.85	5,724.43	21.51	-260.89	14,457,703.17	1,720,767.09	39.81007356	-80.71387776
5,900.00	35.02	277.85	5,806.32	29.34	-317.74	14,457,711.01	1,720,710.24	39.81009557	-80.71408011
6,000.00	35.02	277.85	5,888.22	37.18	-374.59	14,457,718.84	1,720,653.38	39.81011759	-80.71428247
6,100.00	35.02	277.85	5,970.11	45.01	-431.45	14,457,726.68	1,720,596.53	39.81013960	-80.71448482
6,200.00	35.02	277.85	6,052.00	52.84	-488.30	14,457,734.51	1,720,539.68	39.81016161	-80.71468717
6,224.35	35.02	277.85	6,071.94	54.75	-502.14	14,457,736.42	1,720,525.84	39.81016697	-80.71473644
Begin 10°/100' build/turn									
6,300.00	31.47	265.63	6,135.27	56.21	-543.39	14,457,737.88	1,720,484.58	39.81017135	-80.71488332
6,400.00	28.95	246.31	6,221.89	44.47	-591.71	14,457,726.14	1,720,436.27	39.81013953	-80.71505549
6,500.00	29.48	225.77	6,309.39	17.52	-631.60	14,457,699.18	1,720,396.38	39.81006585	-80.71519786
6,600.00	32.90	207.55	6,395.12	-23.83	-661.87	14,457,657.83	1,720,366.11	39.80995256	-80.71530611
6,700.00	38.45	193.22	6,476.46	-78.32	-681.59	14,457,603.35	1,720,346.39	39.80980310	-80.71537694
6,800.00	45.34	182.32	6,550.96	-144.29	-690.16	14,457,537.38	1,720,337.82	39.80962200	-80.71540821
6,900.00	53.04	173.86	6,616.33	-219.74	-687.32	14,457,461.93	1,720,340.66	39.80941477	-80.71539896
7,000.00	61.22	167.01	6,670.61	-302.37	-673.16	14,457,379.29	1,720,354.81	39.80918771	-80.71534948
7,100.00	69.70	161.17	6,712.13	-389.68	-648.11	14,457,291.98	1,720,379.86	39.80894772	-80.71526128
7,200.00	78.35	155.95	6,739.64	-479.02	-612.93	14,457,202.65	1,720,415.04	39.80870208	-80.71513702
7,300.00	87.09	151.05	6,752.30	-567.66	-568.69	14,457,114.01	1,720,459.29	39.80845827	-80.71498049
7,321.75	89.00	150.00	6,753.04	-586.58	-558.00	14,457,095.09	1,720,469.98	39.80840622	-80.71494262
Begin 89.00° lateral section									
7,400.00	89.00	150.00	6,754.40	-654.33	-518.88	14,457,027.33	1,720,509.10	39.80821979	-80.71480409
7,500.00	89.00	150.00	6,756.15	-740.92	-468.88	14,456,940.74	1,720,559.09	39.80798156	-80.71462706
7,600.00	89.00	150.00	6,757.89	-827.51	-418.89	14,456,854.15	1,720,609.09	39.80774333	-80.71445003
7,700.00	89.00	150.00	6,759.64	-914.10	-368.90	14,456,767.56	1,720,659.08	39.80750509	-80.71427300
7,800.00	89.00	150.00	6,761.38	-1,000.69	-318.91	14,456,680.97	1,720,709.07	39.80726686	-80.71409598
7,900.00	89.00	150.00	6,763.13	-1,087.28	-268.92	14,456,594.38	1,720,759.06	39.80702862	-80.71391895
8,000.00	89.00	150.00	6,764.87	-1,173.87	-218.92	14,456,507.80	1,720,809.06	39.80679039	-80.71374193
8,100.00	89.00	150.00	6,766.62	-1,260.46	-168.93	14,456,421.21	1,720,859.05	39.80655215	-80.71356491
8,200.00	89.00	150.00	6,768.36	-1,347.05	-118.94	14,456,334.62	1,720,909.04	39.80631392	-80.71338789
8,300.00	89.00	150.00	6,770.11	-1,433.64	-68.95	14,456,248.03	1,720,959.03	39.80607568	-80.71321087
8,400.00	89.00	150.00	6,771.85	-1,520.23	-18.95	14,456,161.44	1,721,009.03	39.80583744	-80.71303385
8,500.00	89.00	150.00	6,773.60	-1,606.82	31.04	14,456,074.85	1,721,059.02	39.80559921	-80.71285683
8,600.00	89.00	150.00	6,775.35	-1,693.41	81.03	14,455,988.26	1,721,109.01	39.80536097	-80.71267982
8,700.00	89.00	150.00	6,777.09	-1,780.00	131.02	14,455,901.67	1,721,159.00	39.80512273	-80.71250280
8,800.00	89.00	150.00	6,778.84	-1,866.58	181.02	14,455,815.08	1,721,208.99	39.80488450	-80.71232579
8,900.00	89.00	150.00	6,780.58	-1,953.17	231.01	14,455,728.49	1,721,258.99	39.80464626	-80.71214878
9,000.00	89.00	150.00	6,782.33	-2,039.76	281.00	14,455,641.90	1,721,308.98	39.80440802	-80.71197176
9,100.00	89.00	150.00	6,784.07	-2,126.35	330.99	14,455,555.31	1,721,358.97	39.80416978	-80.71179475
9,200.00	89.00	150.00	6,785.82	-2,212.94	380.99	14,455,468.72	1,721,408.96	39.80393155	-80.71161775



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 2-04 HM (slot F)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1331+28 @ 1359.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1331+28 @ 1359.00usft
Site:	Heaven Hill 2	North Reference:	Grid
Well:	Heaven Hill 2-04 HM (slot F)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev7		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,300.00	89.00	150.00	6,787.56	-2,299.53	430.98	14,455,382.13	1,721,458.96	39.80369331	-80.71144074
9,400.00	89.00	150.00	6,789.31	-2,386.12	480.97	14,455,295.54	1,721,508.95	39.80345507	-80.71126373
9,500.00	89.00	150.00	6,791.05	-2,472.71	530.96	14,455,208.96	1,721,558.94	39.80321683	-80.71108673
9,600.00	89.00	150.00	6,792.80	-2,559.30	580.96	14,455,122.37	1,721,608.93	39.80297859	-80.71090972
9,700.00	89.00	150.00	6,794.54	-2,645.89	630.95	14,455,035.78	1,721,658.93	39.80274035	-80.71073272
9,800.00	89.00	150.00	6,796.29	-2,732.48	680.94	14,454,949.19	1,721,708.92	39.80250211	-80.71055572
9,900.00	89.00	150.00	6,798.03	-2,819.07	730.93	14,454,862.60	1,721,758.91	39.80226387	-80.71037872
10,000.00	89.00	150.00	6,799.78	-2,905.66	780.93	14,454,776.01	1,721,808.90	39.80202563	-80.71020172
10,100.00	89.00	150.00	6,801.52	-2,992.25	830.92	14,454,689.42	1,721,858.90	39.80178739	-80.71002472
10,200.00	89.00	150.00	6,803.27	-3,078.84	880.91	14,454,602.83	1,721,908.89	39.80154915	-80.70984773
10,300.00	89.00	150.00	6,805.01	-3,165.42	930.90	14,454,516.24	1,721,958.88	39.80131090	-80.70967073
10,400.00	89.00	150.00	6,806.76	-3,252.01	980.89	14,454,429.65	1,722,008.87	39.80107266	-80.70949374
10,500.00	89.00	150.00	6,808.50	-3,338.60	1,030.89	14,454,343.06	1,722,058.87	39.80083442	-80.70931674
10,600.00	89.00	150.00	6,810.25	-3,425.19	1,080.88	14,454,256.47	1,722,108.86	39.80059618	-80.70913975
10,700.00	89.00	150.00	6,812.00	-3,511.78	1,130.87	14,454,169.88	1,722,158.85	39.80035794	-80.70896276
10,800.00	89.00	150.00	6,813.74	-3,598.37	1,180.86	14,454,083.29	1,722,208.84	39.80011969	-80.70878577
10,900.00	89.00	150.00	6,815.49	-3,684.96	1,230.86	14,453,996.70	1,722,258.83	39.79988145	-80.70860879
11,000.00	89.00	150.00	6,817.23	-3,771.55	1,280.85	14,453,910.11	1,722,308.83	39.79964321	-80.70843180
11,100.00	89.00	150.00	6,818.98	-3,858.14	1,330.84	14,453,823.53	1,722,358.82	39.79940496	-80.70825481
11,200.00	89.00	150.00	6,820.72	-3,944.73	1,380.83	14,453,736.94	1,722,408.81	39.79916672	-80.70807783
11,300.00	89.00	150.00	6,822.47	-4,031.32	1,430.83	14,453,650.35	1,722,458.80	39.79892848	-80.70790085
11,400.00	89.00	150.00	6,824.21	-4,117.91	1,480.82	14,453,563.76	1,722,508.80	39.79869023	-80.70772386
11,500.00	89.00	150.00	6,825.96	-4,204.50	1,530.81	14,453,477.17	1,722,558.79	39.79845199	-80.70754688
11,600.00	89.00	150.00	6,827.70	-4,291.09	1,580.80	14,453,390.58	1,722,608.78	39.79821374	-80.70736990
11,700.00	89.00	150.00	6,829.45	-4,377.68	1,630.80	14,453,303.99	1,722,658.77	39.79797550	-80.70719293
11,800.00	89.00	150.00	6,831.19	-4,464.27	1,680.79	14,453,217.40	1,722,708.77	39.79773725	-80.70701595
11,900.00	89.00	150.00	6,832.94	-4,550.85	1,730.78	14,453,130.81	1,722,758.76	39.79749900	-80.70683897
12,000.00	89.00	150.00	6,834.68	-4,637.44	1,780.77	14,453,044.22	1,722,808.75	39.79726076	-80.70666200
12,100.00	89.00	150.00	6,836.43	-4,724.03	1,830.77	14,452,957.63	1,722,858.74	39.79702251	-80.70648502
12,200.00	89.00	150.00	6,838.17	-4,810.62	1,880.76	14,452,871.04	1,722,908.74	39.79678427	-80.70630805
12,300.00	89.00	150.00	6,839.92	-4,897.21	1,930.75	14,452,784.45	1,722,958.73	39.79654602	-80.70613108
12,400.00	89.00	150.00	6,841.66	-4,983.80	1,980.74	14,452,697.86	1,723,008.72	39.79630777	-80.70595411
12,500.00	89.00	150.00	6,843.41	-5,070.39	2,030.73	14,452,611.27	1,723,058.71	39.79606952	-80.70577714
12,600.00	89.00	150.00	6,845.16	-5,156.98	2,080.73	14,452,524.69	1,723,108.71	39.79583128	-80.70560018
12,700.00	89.00	150.00	6,846.90	-5,243.57	2,130.72	14,452,438.10	1,723,158.70	39.79559303	-80.70542321
12,800.00	89.00	150.00	6,848.65	-5,330.16	2,180.71	14,452,351.51	1,723,208.69	39.79535478	-80.70524625
12,900.00	89.00	150.00	6,850.39	-5,416.75	2,230.70	14,452,264.92	1,723,258.68	39.79511653	-80.70506928
13,000.00	89.00	150.00	6,852.14	-5,503.34	2,280.70	14,452,178.33	1,723,308.67	39.79487828	-80.70489232
13,100.00	89.00	150.00	6,853.88	-5,589.93	2,330.69	14,452,091.74	1,723,358.67	39.79464003	-80.70471536
13,200.00	89.00	150.00	6,855.63	-5,676.52	2,380.68	14,452,005.15	1,723,408.66	39.79440178	-80.70453840
13,300.00	89.00	150.00	6,857.37	-5,763.11	2,430.67	14,451,918.56	1,723,458.65	39.79416353	-80.70436144
13,400.00	89.00	150.00	6,859.12	-5,849.69	2,480.67	14,451,831.97	1,723,508.64	39.79392528	-80.70418448
13,500.00	89.00	150.00	6,860.86	-5,936.28	2,530.66	14,451,745.38	1,723,558.64	39.79368703	-80.70400753
13,600.00	89.00	150.00	6,862.61	-6,022.87	2,580.65	14,451,658.79	1,723,608.63	39.79344878	-80.70383057
13,700.00	89.00	150.00	6,864.35	-6,109.46	2,630.64	14,451,572.20	1,723,658.62	39.79321053	-80.70365362
13,800.00	89.00	150.00	6,866.10	-6,196.05	2,680.64	14,451,485.61	1,723,708.61	39.79297228	-80.70347666
13,900.00	89.00	150.00	6,867.84	-6,282.64	2,730.63	14,451,399.02	1,723,758.61	39.79273403	-80.70329971
14,000.00	89.00	150.00	6,869.59	-6,369.23	2,780.62	14,451,312.43	1,723,808.60	39.79249578	-80.70312276
14,100.00	89.00	150.00	6,871.33	-6,455.82	2,830.61	14,451,225.84	1,723,858.59	39.79225753	-80.70294581
14,200.00	89.00	150.00	6,873.08	-6,542.41	2,880.61	14,451,139.26	1,723,908.58	39.79201928	-80.70276887
14,300.00	89.00	150.00	6,874.82	-6,629.00	2,930.60	14,451,052.67	1,723,958.58	39.79178102	-80.70259192
14,400.00	89.00	150.00	6,876.57	-6,715.59	2,980.59	14,450,966.08	1,724,008.57	39.79154277	-80.70241497
14,500.00	89.00	150.00	6,878.31	-6,802.18	3,030.58	14,450,879.49	1,724,058.56	39.79130452	-80.70223803
14,600.00	89.00	150.00	6,880.06	-6,888.77	3,080.57	14,450,792.90	1,724,108.55	39.79106626	-80.70206109
14,700.00	89.00	150.00	6,881.81	-6,975.36	3,130.57	14,450,706.31	1,724,158.55	39.79082801	-80.70188415



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Heaven Hill 2-04 HM (slot F)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1331+28 @ 1359.00usft
Project:	Marshall County, West Virginia	MD Reference:	RKB=1331+28 @ 1359.00usft
Site:	Heaven Hill 2	North Reference:	Grid
Well:	Heaven Hill 2-04 HM (slot F)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev7		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
14,800.00	89.00	150.00	6,883.55	-7,061.95	3,180.56	14,450,619.72	1,724,208.54	39.79058976	-80.70170721
14,900.00	89.00	150.00	6,885.30	-7,148.54	3,230.55	14,450,533.13	1,724,258.53	39.79035150	-80.70153027
15,000.00	89.00	150.00	6,887.04	-7,235.12	3,280.54	14,450,446.54	1,724,308.52	39.79011325	-80.70135333
15,100.00	89.00	150.00	6,888.79	-7,321.71	3,330.54	14,450,359.95	1,724,358.51	39.78987499	-80.70117639
15,200.00	89.00	150.00	6,890.53	-7,408.30	3,380.53	14,450,273.36	1,724,408.51	39.78963674	-80.70099946
15,300.00	89.00	150.00	6,892.28	-7,494.89	3,430.52	14,450,186.77	1,724,458.50	39.78939848	-80.70082252
15,400.00	89.00	150.00	6,894.02	-7,581.48	3,480.51	14,450,100.18	1,724,508.49	39.78916023	-80.70064559
15,500.00	89.00	150.00	6,895.77	-7,668.07	3,530.51	14,450,013.59	1,724,558.48	39.78892197	-80.70046866
15,600.00	89.00	150.00	6,897.51	-7,754.66	3,580.50	14,449,927.00	1,724,608.48	39.78868372	-80.70029173
15,700.00	89.00	150.00	6,899.26	-7,841.25	3,630.49	14,449,840.42	1,724,658.47	39.78844546	-80.70011480
15,800.00	89.00	150.00	6,901.00	-7,927.84	3,680.48	14,449,753.83	1,724,708.46	39.78820720	-80.69993787
15,900.00	89.00	150.00	6,902.75	-8,014.43	3,730.48	14,449,667.24	1,724,758.45	39.78796895	-80.69976094
15,971.75	89.00	150.00	6,904.00	-8,076.55	3,766.34	14,449,605.11	1,724,794.32	39.78779800	-80.69963400
PBHL/TD									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Heaven Hill 2-4 LP r5 - hit/miss target - Shape - Point	0.00	0.00	6,745.00	-190.84	-787.12	14,457,490.82	1,720,240.86	39.80949500	-80.71575400
- plan misses target center by 160.39usft at 6931.91usft MD (6634.94 TVD, -245.44 N, -684.02 E)									
Heaven Hill 2-4 PBHL r5 - plan hits target center - Point	0.00	0.01	6,904.00	-8,076.55	3,766.34	14,449,605.11	1,724,794.32	39.78779800	-80.69963400

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,100.00	1,100.00	13 3/8" Casing @ 1100 TVD	13-3/8	17-1/2
2,800.89	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	
1,600.00	1,600.00	0.00	0.00	KOP Begin 2°/100' build	
1,750.00	1,749.93	-1.96	3.40	Begin 3.00° tangent section	
2,250.00	2,249.25	-15.05	26.06	Begin 1°/100' drop	
2,550.00	2,549.11	-18.97	32.86	Begin vertical hold section	
5,000.89	5,000.00	-18.97	32.86	Begin 6°/100' build	
5,584.59	5,548.02	4.63	-138.42	Begin 35.02° tangent section	
6,224.35	6,071.94	54.75	-502.14	Begin 10°/100' build/turn	
7,321.75	6,753.04	-586.58	-558.00	Begin 89.00° lateral section	
15,971.75	6,904.00	-8,076.55	3,766.34	PBHL/TD	

Received
Office of Oil & Gas
MAY 01 2017

**HEAVEN HILL UNIT 2-4HM
WELL PLAT LEASE INFORMATION**

Lease No.	Tag	Parcel	OIL & GAS ROYALTY OWNER	Deed Book	Deed Page
10*15505	A	9-7-3	RALPH E. WELLMAN	686	412
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10*47051.255.0	B	9-6-7	SCOTT C & CAROLYN R HARRIS	879	296
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10*15511	C	9-6-9	DAVID E CROW	718	376
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10*15585	F	9-11-5	SHARON L WHETZAL	687	147
10*15586	F	9-11-5	MARY A SOUTH	690	615
10*15587	F	9-11-5	ROBERT L WHETZAL	690	559
10*15588	F	9-11-5	RAY A WHETZAL JR	693	571
10*15589	F	9-11-5	MARK L WHETZAL	693	576
10*47051.108.1	F	9-11-5	MICHAEL A WHETZEL	885	51
10*47051.108.5	F	9-11-5	BRENDA J WHETZEL	885	55
10*15604	G	9-11-13	HAYHURST COMPANY A FLORIDA PARTNERSHIP	724	8

05/12/2017

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

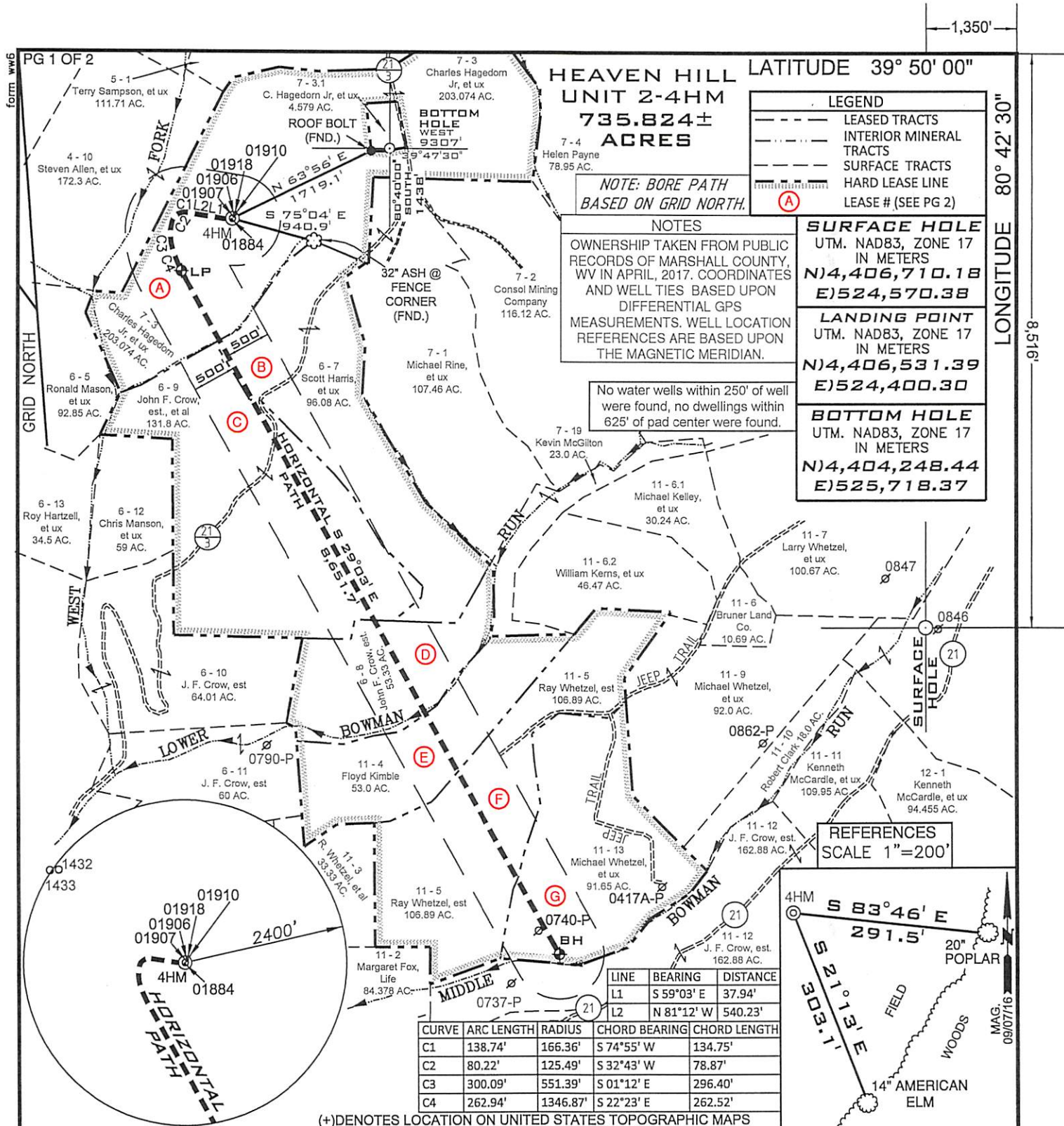
DESIGNATED AGENT DIANNA STAMPER
CT CORPORATION SYSTEM
ADDRESS 5400 D BIG TYLER ROAD
CHARLESTON, WV 25313

ADDRESS 1350 SOUTH UNIVERSITY DRIVE, SUITE 200
 WEIT OPERATOR THE HILL OPERATING, LLC

ADDRESS 2400 D BIC LAGER ROAD
 DESIGNATED AGENT CL CORPORATION SYSTEM
 DIANNA STAMPER

JO*J2E04	E	0-11-13	НАУНУБЭТ СОМЪАНУ А ЕГОРИДА БАРТИЕРЭНИБ	154	8
JO*4102J.108'2	E	0-11-2	BRENDA I WHEITZEL	882	22
JO*4102J.108'1	E	0-11-2	MICHAEL A WHEITZEL	882	21
JO*J2280	E	0-11-2	MARK G WHEITZEL	003	210
JO*J2288	E	0-11-2	KAY A WHEITZEL IB	003	211
JO*J2281	E	0-11-2	ROBERT G WHEITZEL	000	220
JO*J228E	E	0-11-2	MARY A SOUTH	000	012
JO*J2282	E	0-11-2	ZHAYON G WHEITZEL	081	141
JO*J2284	E	0-11-2	LICKIE MASON	080	530
JO*J0211	E	0-11-4	BHDK INVESTMENTS	001	220
JO*4102J.153'5	D	0-0-8	JAMES B HOGGIDAY AND JACQUELINE HOGGIDAY	813	143
JO*4102J.153'1	D	0-0-8	GLOYD E BAKER	802	380
JO*J2250	D	0-0-8	LIMOTHY SCOM	150	285
JO*J2210	D	0-0-8	JOHN SCOM	150	280
JO*J2218	D	0-0-8	JAMES B HOGGIDAY AND JACQUELINE HOGGIDAY	118	341
JO*J2211	D	0-0-8	DIANNE BEGNER & GARY BEGNER	118	342
JO*J221E	D	0-0-8	BOZE MARIE KIEGECSEMSKI	118	324
JO*J2212	D	0-0-8	DEBIE G SCOM	118	334
JO*J2214	D	0-0-8	G BANG SCOM	118	330
JO*J2213	D	0-0-8	KAY KELEZ	118	330
JO*J2215	D	0-0-8	FRANCES COFFEY	118	318
JO*J2211	D	0-0-8	DAVID E SCOM	118	310
JO*J2210	D	0-0-8	EGVINE BHEGZ ET LIV	118	350
JO*4102J.153'5	C	0-0-0	JAMES B HOGGIDAY AND JACQUELINE HOGGIDAY	813	143
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JO*J2211	C	0-0-0	DAVID E SCOM	118	310
JO*J2210	C	0-0-0	EGVINE BHEGZ ET LIV	118	350
JO*4102J.522'0	B	0-0-1	ZCOTT C & SAVOGLI B HARRIS	810	500
JO*4102J.013'3	A	0-1-3	TRIEBEREL HODDINGS, LLC	818	330
JO*4102J.013'5	A	0-1-3	PATRIOT RESTORATIONS LLC	008	241
JO*4102J.013'1	A	0-1-3	LEIVISO ST21 SENTURY EMBEL INC	888	018
JO*J2008	A	0-1-3	SHARLES B HAGEDONI IB	810	453
JO*J2251	A	0-1-3	LEIVISO ST21 SENTURY EMBEL INC	155	501
JO*J2202	A	0-1-3	BAGBY E WEGMAN	080	415
16926 No.	169	16901	OIG & GAS BOULGIA OMIBER	Deed Book	Deed Page

05/12/2017



HEAVEN HILL
UNIT 2-4HM
735.824±
ACRES

LATITUDE 39° 50' 00"

LONGITUDE 80° 42' 30"

LEGEND

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

NOTE: BORE PATH BASED ON GRID NORTH.

NOTES
 OWNERSHIP TAKEN FROM PUBLIC RECORDS OF MARSHALL COUNTY, WV IN APRIL, 2017. COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS. WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.

SURFACE HOLE
 UTM. NAD83, ZONE 17
 IN METERS
N)4,406,710.18
E)524,570.38

LANDING POINT
 UTM. NAD83, ZONE 17
 IN METERS
N)4,406,531.39
E)524,400.30

BOTTOM HOLE
 UTM. NAD83, ZONE 17
 IN METERS
N)4,404,248.44
E)525,718.37

No water wells within 250' of well were found, no dwellings within 625' of pad center were found.

REFERENCES
 SCALE 1"=200'

LINE	BEARING	DISTANCE
L1	S 59°03' E	37.94'
L2	N 81°12' W	540.23'

(+) DENOTES LOCATION ON UNITED STATES TOPOGRAPHIC MAPS

FILE NUMBER 163-697
 DRAWING NUMBER HHU2_WP_4HM_REV1
 SCALE 1" = 1500'
 MINIMUM DEGREE OF ACCURACY 1/2500
 PROVEN SOURCE OF ELEVATION SUBMETER MAPPING
 GRADE GPS

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

P.S. 2122 *Jonathan N. White*



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



DATE: DECEMBER 19, 2016
 DATE REVISED: APRIL 27, 2017
 OPERATORS WELL NO. Heaven Hill Unit 2-4HM
 API WELL NO.

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

47-051-01908
 STATE COUNTY PERMIT

LOCATION ELEVATION 1331' WATERSHED (HUC 10) FISH CREEK
 DISTRICT MEADE COUNTY MARSHALL
 QUADRANGLE GLEN EASTON 7.5' LEASE NUMBER SEE ATTACHED PG 2 OF 2

SURFACE OWNER CHARLES R. HAGEDORN, JR., ET UX ACREAGE 203.074
 OIL & GAS ROYALTY OWNER CHARLES R. HAGEDORN, JR., ET AL LEASE ACREAGE 735.824
 PROPOSED WORK: DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ___
 PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE (SPECIFY) ___
 PLUG & ABANDON ___ CLEAN OUT & REPLUG ___
 TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD 6,879' TMD:15,972'
 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

05/12/2017

COUNTY NAME PERMIT

HEAVEN HILL UNIT 2-4HM
WELL PLAT LEASE INFORMATION

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05/12/2017

Receiver
Office of Oil & Gas
MAY 01 2017

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

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



April 29, 2017

WVDEP Office of Oil & Gas
Attn: Laura Adkins
601 57th Street, SE
Charleston, WV 25304-2345

Received
Office of Oil & Gas
MAY 01 2017

VIA: USPS

Subject: Permit Modification Request for Heaven Hill Unit 2-4HM API 47-051-01908 (Revised Directional Drilling Plan) located in Meade District; Marshall County, WV

Dear Laura:

Tug Hill Operating, LLC would like to submit the enclosed permit modification request to our existing permit for the Heaven Hill Unit 2-4HM API 47-051-01908 to explore for Marcellus potential. This proposed well is located in Marshall County, WV.

Please find the following enclosed revisions for revising the directional drilling plan between the surface location and the landing point note no changes have been made to the surface hole, landing point or bottom hole location as previously submitted:

- Revised Site Safety Plans (on CD) with the following changes:
 - Updated date of plans
 - 2.1 – Updated Driving directions
 - 2.3.7 – Well Plat Exhibit 4A+4B
 - 9.2 – WW-6B Exhibit 1A, 1B, 1C + 1D
 - 9.2 – Casing and Cementing Program Exhibit 2
 - 9.2 – Well Bore Diagram Exhibit 3
 - Appendix A – Updated Emergency Notification List
- Revised WW-6B form with the following changes
 - 17) (A) revised subsea level depth
 - 18) Revised Cement Fill-Up on all strings and on Production casing revised footages for drilling and intervals left in well
 - 24) Revised cement additives and attachment
 - Revised Well Bore Diagram for cement volumes and production casing length / TMD
 - Revised directional drilling plan
- Revised Mylar Well Plat
 - Revised well path from surface hole to landing point
 - New well permits in spot circle



- Revised date
- TVD and TMD

If you have any question or need any additional information please feel free to call me at 304-689-7676. Thank you for reviewing this application. I greatly appreciate it.

Sincerely,

A handwritten signature in blue ink that reads "Jonathan White".

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

Received
Office of Oil & Gas
MAY 01 2017