



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

Harold D. Ward, Cabinet Secretary
www.dep.wv.gov

Monday, November 4, 2019
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

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

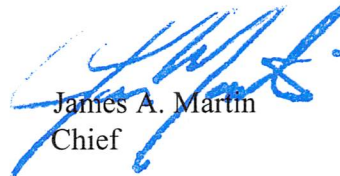
Re: Permit Modification Approval for BRYAN N-13HU
47-051-02030-00-00

Modified landing point and bottom hole locations for spacing

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.

A blue ink signature of James A. Martin, written in a cursive style.

James A. Martin
Chief

Operator's Well Number: BRYAN N-13HU
Farm Name: CNX LAND RESOURCES INC.
U.S. WELL NUMBER: 47-051-02030-00-00
Horizontal 6A New Drill
Date Modification Issued: 11/04/2019

Promoting a healthy environment.



west virginia department of environmental protection

Oil and Gas Conservation Commission
601 57th Street SE, Charleston, WV 25304
304-926-0499 Ext 1274

dep.wv.gov

November 1, 2019

Department of Environmental Protection
Office of Oil and Gas
Charleston, WV 25304

RE: Application for Deep Well Permit – API #47-051-02030

COMPANY: Tug Hill Operating, LLC

FARM: CNX Land Resources, Inc. Bryan N-13HU

COUNTY: Marshall DISTRICT: Franklin QUAD: Powhatan Point

The deep well review of the application for the above company is **Approved to drill to the Trenton for Point Pleasant completion.**

The applicant has complied with the provision of Chapter 22C-9, of the Code of West Virginia, nineteen hundred and thirty-one (1931), as amended, Oil and Gas Conservation Commission as follows:

1. Comments to Notice of Deviation filed? NA
2. Provided a certified copy of duly acknowledged and recorded consent and easement form from all surface owners? yes
3. Provided a tabulation of all deep wells within one mile of the proposed location, including the API number of all deep wells: *yes
4. Provided a plat showing that the proposed location is a distance of 400+ feet from the nearest lease line or unit boundary and showing the following wells drilled to or capable of producing from the objective formation within 3,000 feet of the proposed location.

Sincerely,

Susan Rose
Administrator

*Bryan N-12HU 47-051-02029, Bryan N-14HU 47-051-02031; Corley N-9HU 47-051-01983; Corley N-10HU 47-051-01998; Michter N-6HU 47-051-02206; Michter N-7HU 47-051-02207; Michter N-8HU 47-051-02219; Michter N-9HU 47-051-02220; Woodford 10HU 47-051-02152; Woodford 9HU 47-051-02150

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: Tug Hill Operating, LLC

<u>494510851</u>	<u>Marshall</u>	<u>Franklin</u>	<u>Powhatan Point</u>
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Operator ID County District Quadrangle

2) Operator's Well Number: Bryan N-13HU Well Pad Name: Bryan

3) Farm Name/Surface Owner: CNX Land Resources, Inc. Public Road Access: Rines Ridge Rd

4) Elevation, current ground: 1191' Elevation, proposed post-construction: 1191'

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

(b) If Gas Shallow _____ Deep

Horizontal *JM* 7/31/19

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Point Pleasant is the target formation at a depth of 11,164' - 11,283' thickness of 119' and anticipated pressure of approx. 9000 psi

8) Proposed Total Vertical Depth: 11,433'

9) Formation at Total Vertical Depth: Trenton

10) Proposed Total Measured Depth: 22,924'

11) Proposed Horizontal Leg Length: 10,997.04'

12) Approximate Fresh Water Strata Depths: 70'; 843'

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: 2040'

15) Approximate Coal Seam Depths: Sewickly Coal - 741' and Pittsburgh Coal - 836'

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

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

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

WW-6B
(04/15)

API NO. 47- 051 - 02030
 OPERATOR WELL NO. Bryan N-13HU
 Well Pad Name: Bryan

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	100'	100'	216FT^3(CTS)
Fresh Water	20"	NEW	J55	106.5#	940'	940'	1,505ft^3(CTS)
Coal	13 3/8"	NEW	J55	54.5#	2,830'	2,830'	1,996ft^3(CTS)
Intermediate	9 5/8"	NEW	HPP110	47#	10,250'	10,250'	3,351ft^3(CTS)
Production	5 1/2"	NEW	HCP110	23#	22,924'	22,924'	5,426ft^3(CTS)
Tubing	2 7/8"	NEW	P110	6.5#		10,926'	
Liners							

M 7/31/19

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	20"	26"	.5	2,410	1,928	SEE #24	1.2
Coal	13 3/8"	17 1/2"	.38	2,740	2,192	SEE#24	1.2
Intermediate	9 5/8"	12 1/4"	.472	10,730	6,968	SEE#24	1.99
Production	5 1/2"	8 1/2"	.415	13,580	10,864	SEE#24	1.18
Tubing	2 7/8"			14,530	11,624		
Liners							

PACKERS

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

WW-6B
(10/14)

API NO. 47- 051 - 02030
OPERATOR WELL NO. Bryan N-13HU
Well Pad Name: Bryan

JM 7/31/19

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

Drill through the Point Pleasant and TD Pilot Hole 150' into the Trenton. 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 27,500,000 lb proppant and 425,170 bbl of water. Max rate = 80 bpm; max psi = 9,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 16.14

22) Area to be disturbed for well pad only, less access road (acres): 5.98

23) Describe centralizer placement for each casing string:

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

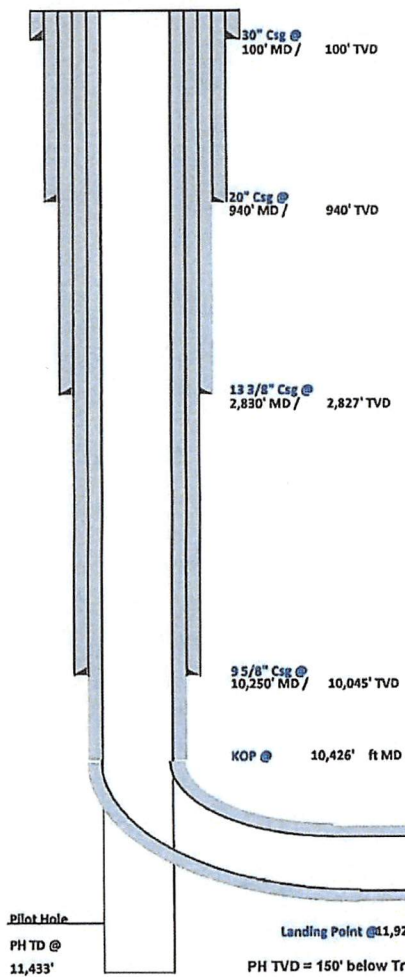
24) Describe all cement additives associated with each cement type:

*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

*Note: Attach additional sheets as needed.



WELL NAME: Bryan N-13HU
STATE: West Virginia **COUNTY:** Marshall
DISTRICT: Franklin
DF Elev: 1,216' **GL Elev:** 1,191'
TD: 22,924'
TH Latitude: 39.77561617
TH Longitude: -80.77651946
BH Latitude: 39.80364999
BH Longitude: -80.790643

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	843'
Sewickley Coal	741'
Pittsburgh Coal	836'
Big Lime	2,010'
Berea	2,559'
Tully	6,402'
Marcellus	6,483'
Onondaga	6,536'
Salina	7,226'
Lockport	8,251'
Utica	10,910'
Point Pleasant	11,164'
Landing Depth	11,214'
Trenton	11,283'
Pilot Hole TD	11,433'

CASING SUMMARY							
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Depth (TVD)	Weight (lb/ft)	Grade	Top of Cement
Conductor	36	30	100'	100'	BW	BW	Surface
Surface	26	20	940'	940'	106.5	J55	Surface
Intermediate 1	17 1/2	13 3/8	2,830'	2,827'	54.5	J55	Surface
Intermediate 2	12 1/4	9 5/8	10,250'	10,045'	47	HP110	Surface
Production	8 1/2	5 1/2	22,924'	10,830'	23	P110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	291	A	15.6	Air	None
Surface	1,636	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	2,166	A	15	Air	1 Centralizer every other jt
Intermediate 2	2,823	A	14.5	Air	1 Centralizer every other jt
Production	4,807	A	15	Air / SOBM	1 every other joint in lateral; 1 per joint in curves; 1 every other jt to sfc

Lateral TD @ 22,924' ft MD
 10,830' ft TVD

7/31/19
[Signature]

Landing Point @ 11,924' MD / 11,214' TVD
 PH TVD = 150' below Trenton Top

Pilot Hole
 PH TD @ 11,433'



Tug Hill Operating, LLC Casing and Cement Program

Bryan N-13HU

Casing

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	100'	CTS
Surface	20"	J55	26"	940'	CTS
Intermediate 1	13 3/8"	J55	17 1/2"	2,830'	CTS
Intermediate 2	9 5/8"	HP110	12 1/4"	10,250'	CTS
Production	5 1/2"	P110	8 1/2"	22,924'	CTS

Cement

Surface: Premium NE-1 + 2% bwoc CaC12 + 46.5% Fresh Water – Surface Cement mixed at 15.6 ppg, Y=1.2

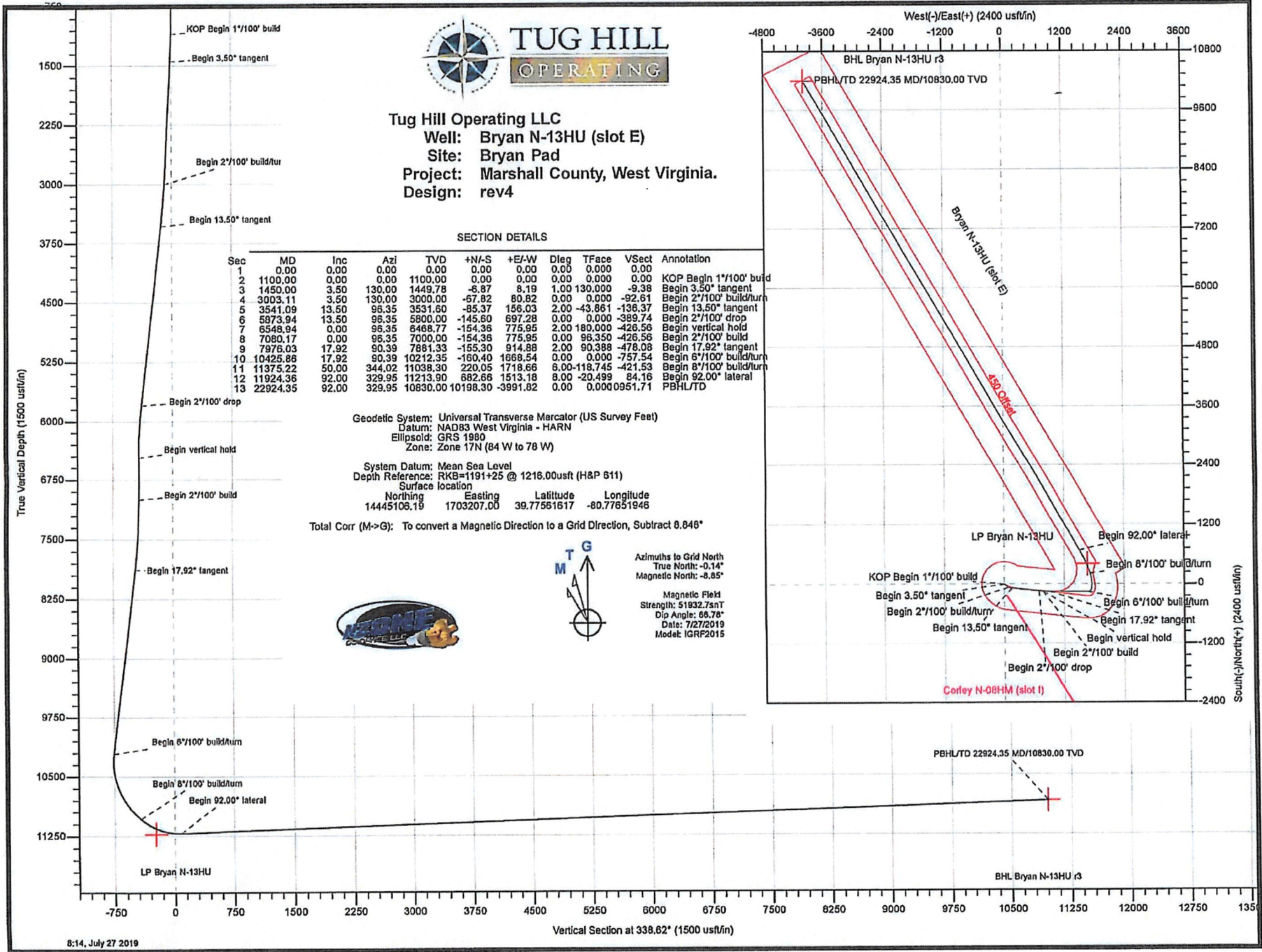
Intermediate 1: Premium NE-1 + 1% bwoc CaC12 + 46.5% Fresh Water – Intermediate Cement mixed at 15.6 ppg, Y=1.2

Intermediate 2: Premium NE-1 + 1% bwoc CaC12 + 46.5% Fresh Water – Intermediate Cement mixed at 15.6 ppg, Y=1.99

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 = 1.18



Tug Hill Operating LLC
 Well: Bryan N-13HU (slot E)
 Site: Bryan Pad
 Project: Marshall County, West Virginia.
 Design: rev4



SECTION DETAILS

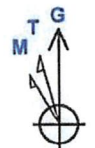
Sec	MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	
2	1100.00	0.00	0.00	1100.00	0.00	0.00	0.00	0.000	0.00	KOP Begin 1°/100' build
3	1450.00	3.50	130.00	1449.78	-8.87	8.19	1.00	130.000	-9.38	Begin 3.50° tangent
4	3003.11	3.50	130.00	3000.00	-67.82	80.82	0.00	0.000	-92.61	Begin 2°/100' build/turn
5	3541.09	13.50	95.35	3531.60	-85.37	156.03	2.00	-43.861	-136.37	Begin 13.50° tangent
6	5873.94	13.50	95.35	5800.00	-145.60	697.28	0.00	0.000	-389.74	Begin 2°/100' drop
7	6548.94	0.00	95.35	6468.77	-154.36	775.95	2.00	180.000	-426.56	Begin vertical hold
8	7080.17	0.00	95.35	7000.00	-154.36	775.95	0.00	95.350	-426.56	Begin 2°/100' build
9	7976.03	17.92	90.39	7881.33	-155.30	914.88	2.00	90.388	-478.08	Begin 17.92° tangent
10	10425.86	17.92	90.39	10212.35	-160.40	1668.54	0.00	0.000	-757.54	Begin 6°/100' build/turn
11	11375.22	50.00	344.02	11038.30	220.05	1718.66	6.00	-118.745	-421.53	Begin 8°/100' build/turn
12	11924.36	92.00	329.95	11213.90	682.66	1513.18	8.00	-20.499	84.16	Begin 92.00° lateral
13	22924.35	92.00	329.95	10830.00	10198.30	-3991.82	0.00	0.000	0951.71	PBHL/TD

Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD83 West Virginia - HARN
 Ellipsoid: GRS 1980
 Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level
 Depth Reference: RKB=1191+25 @ 1216.00usft (H&P 611)

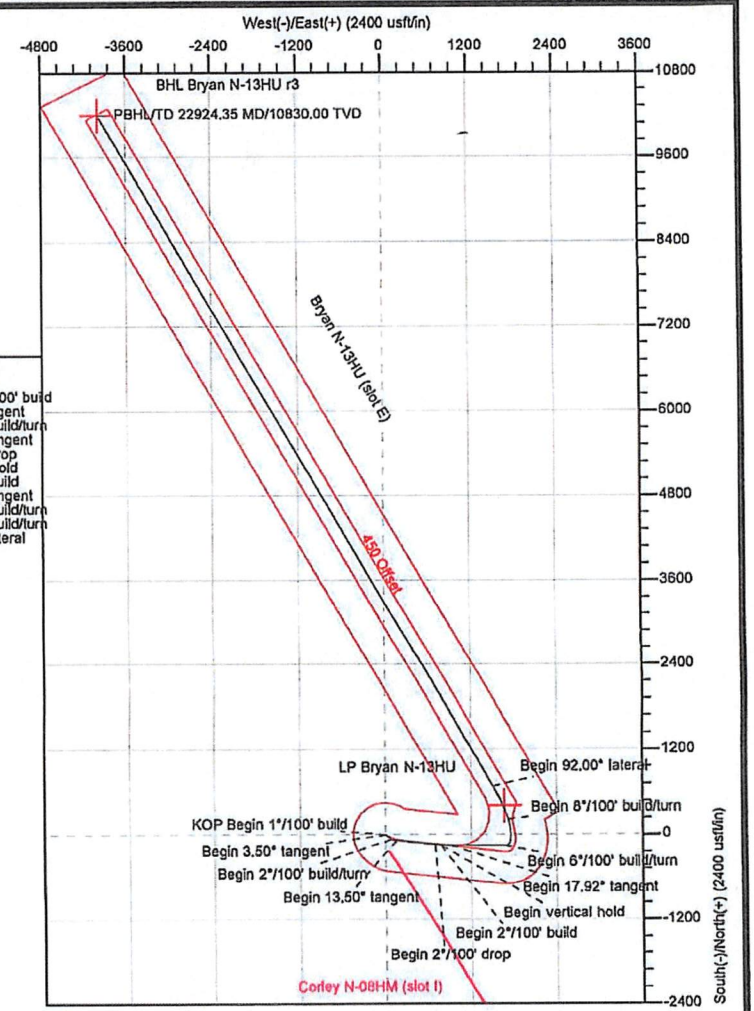
Surface location
 Northing: 14445108.19 Easting: 1703207.00 Latitude: 39.77551617 Longitude: -80.77651946

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.846°



Azimuths to Grid North
 True North: -0.14°
 Magnetic North: -8.85°

Magnetic Field
 Strength: 51932.7snT
 Dip Angle: 66.78°
 Date: 7/27/2019
 Model: IGRF2015





Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	North Reference:	Grid
Well:	Bryan N-13HU (slot E)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

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

Site	Bryan Pad				
Site Position:		Northing:	14,445,110.80 usft	Latitude:	39.77562900
From:	Lat/Long	Easting:	1,703,181.57 usft	Longitude:	-80.77660992
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.143 °

Well	Bryan N-13HU (slot E)					
Well Position	+N/-S	0.00 usft	Northing:	14,445,106.19 usft	Latitude:	39.77561617
	+E/-W	0.00 usft	Easting:	1,703,207.00 usft	Longitude:	-80.77651946
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	1,191.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	7/27/2019	-8.705	66.781	51,932.69042039

Design	rev4			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	338.62

Plan Survey Tool Program	Date	7/27/2019		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	22,924.35 rev4 (Original Hole)	MWD	MWD - Standard



Planning Report - Geographic

Database:	DB_Jul2216d_v14	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	North Reference:	Grid
Well:	Bryan N-13HU (slot E)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

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	0.000
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
1,450.00	3.50	130.00	1,449.78	-6.87	8.19	1.00	1.00	0.00	130.000	0.000
3,003.11	3.50	130.00	3,000.00	-67.82	80.82	0.00	0.00	0.00	0.000	0.000
3,541.09	13.50	96.35	3,531.60	-85.37	156.03	2.00	1.86	-6.25	-43.861	0.000
5,873.94	13.50	96.35	5,800.00	-145.60	697.28	0.00	0.00	0.00	0.000	0.000
6,548.94	0.00	96.35	6,468.77	-154.36	775.95	2.00	-2.00	0.00	180.000	0.000
7,080.17	0.00	96.35	7,000.00	-154.36	775.95	0.00	0.00	0.00	96.350	0.000
7,976.03	17.92	90.39	7,881.33	-155.30	914.88	2.00	2.00	-0.67	90.388	0.000
10,425.86	17.92	90.39	10,212.35	-160.40	1,668.54	0.00	0.00	0.00	0.000	0.000
11,375.22	50.00	344.02	11,038.30	220.05	1,718.66	6.00	3.38	-11.20	-118.745	0.000
11,924.36	92.00	329.95	11,213.90	682.66	1,513.18	8.00	7.65	-2.56	-20.499	0.000
22,924.35	92.00	329.95	10,830.00	10,198.30	-3,991.82	0.00	0.00	0.00	0.000	BHL Bryan N-13HU r



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	North Reference:	Grid
Well:	Bryan N-13HU (slot E)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
100.00	0.00	0.00	100.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
200.00	0.00	0.00	200.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
300.00	0.00	0.00	300.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
400.00	0.00	0.00	400.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
500.00	0.00	0.00	500.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
600.00	0.00	0.00	600.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
700.00	0.00	0.00	700.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
800.00	0.00	0.00	800.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
900.00	0.00	0.00	900.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
KOP Begin 1°/100' build										
1,200.00	1.00	130.00	1,199.99	-0.56	0.67	14,445,105.63	1,703,207.67	39.77561463	-80.77651709	
1,300.00	2.00	130.00	1,299.96	-2.24	2.67	14,445,103.95	1,703,209.68	39.77560999	-80.77650996	
1,400.00	3.00	130.00	1,399.86	-5.05	6.02	14,445,101.14	1,703,213.02	39.77560227	-80.77649810	
1,450.00	3.50	130.00	1,449.78	-6.87	8.19	14,445,099.32	1,703,215.19	39.77559725	-80.77649038	
Begin 3.50° tangent										
1,500.00	3.50	130.00	1,499.69	-8.83	10.52	14,445,097.36	1,703,217.53	39.77559185	-80.77648208	
1,600.00	3.50	130.00	1,599.50	-12.76	15.20	14,445,093.43	1,703,222.20	39.77558104	-80.77646547	
1,700.00	3.50	130.00	1,699.32	-16.68	19.88	14,445,089.51	1,703,226.88	39.77557023	-80.77644886	
1,800.00	3.50	130.00	1,799.13	-20.60	24.55	14,445,085.59	1,703,231.56	39.77555942	-80.77643225	
1,900.00	3.50	130.00	1,898.94	-24.53	29.23	14,445,081.66	1,703,236.23	39.77554861	-80.77641564	
2,000.00	3.50	130.00	1,998.76	-28.45	33.91	14,445,077.74	1,703,240.91	39.77553780	-80.77639903	
2,100.00	3.50	130.00	2,098.57	-32.38	38.58	14,445,073.81	1,703,245.59	39.77552699	-80.77638242	
2,200.00	3.50	130.00	2,198.38	-36.30	43.26	14,445,069.89	1,703,250.26	39.77551618	-80.77636581	
2,300.00	3.50	130.00	2,298.20	-40.22	47.94	14,445,065.96	1,703,254.94	39.77550538	-80.77634920	
2,400.00	3.50	130.00	2,398.01	-44.15	52.61	14,445,062.04	1,703,259.62	39.77549457	-80.77633259	
2,500.00	3.50	130.00	2,497.82	-48.07	57.29	14,445,058.12	1,703,264.29	39.77548376	-80.77631598	
2,600.00	3.50	130.00	2,597.64	-52.00	61.97	14,445,054.19	1,703,268.97	39.77547295	-80.77629937	
2,700.00	3.50	130.00	2,697.45	-55.92	66.64	14,445,050.27	1,703,273.65	39.77546214	-80.77628276	
2,800.00	3.50	130.00	2,797.26	-59.85	71.32	14,445,046.34	1,703,278.32	39.77545133	-80.77626615	
2,900.00	3.50	130.00	2,897.08	-63.77	76.00	14,445,042.42	1,703,283.00	39.77544052	-80.77624954	
3,000.00	3.50	130.00	2,996.89	-67.69	80.67	14,445,038.50	1,703,287.68	39.77542971	-80.77623293	
3,003.11	3.50	130.00	3,000.00	-67.82	80.82	14,445,038.37	1,703,287.82	39.77542938	-80.77623242	
Begin 2°/100' build/tum										
3,100.00	5.08	114.65	3,096.61	-71.50	86.98	14,445,034.68	1,703,293.98	39.77541920	-80.77621052	
3,200.00	6.90	106.67	3,196.07	-75.07	96.76	14,445,031.11	1,703,303.76	39.77540933	-80.77617575	
3,300.00	8.80	102.06	3,295.13	-78.40	110.00	14,445,027.79	1,703,317.00	39.77540012	-80.77612866	
3,400.00	10.74	99.09	3,393.67	-81.47	126.68	14,445,024.72	1,703,333.68	39.77539157	-80.77606932	
3,500.00	12.69	97.03	3,491.58	-84.28	146.78	14,445,021.90	1,703,353.78	39.77538369	-80.77599780	
3,541.09	13.50	96.35	3,531.60	-85.37	156.03	14,445,020.82	1,703,363.03	39.77538066	-80.77596490	
Begin 13.50° tangent										
3,600.00	13.50	96.35	3,588.89	-86.89	169.70	14,445,019.30	1,703,376.70	39.77537639	-80.77591626	
3,700.00	13.50	96.35	3,686.12	-89.47	192.90	14,445,016.72	1,703,399.90	39.77536914	-80.77583371	
3,800.00	13.50	96.35	3,783.36	-92.05	216.10	14,445,014.14	1,703,423.10	39.77536189	-80.77575115	
3,900.00	13.50	96.35	3,880.60	-94.63	239.30	14,445,011.55	1,703,446.30	39.77535464	-80.77566860	
4,000.00	13.50	96.35	3,977.84	-97.22	262.50	14,445,008.97	1,703,469.50	39.77534739	-80.77558605	
4,100.00	13.50	96.35	4,075.07	-99.80	285.70	14,445,006.39	1,703,492.71	39.77534014	-80.77550350	
4,200.00	13.50	96.35	4,172.31	-102.38	308.90	14,445,003.81	1,703,515.91	39.77533288	-80.77542094	
4,300.00	13.50	96.35	4,269.55	-104.96	332.11	14,445,001.23	1,703,539.11	39.77532563	-80.77533839	
4,400.00	13.50	96.35	4,366.78	-107.54	355.31	14,444,998.64	1,703,562.31	39.77531838	-80.77525584	
4,500.00	13.50	96.35	4,464.02	-110.13	378.51	14,444,996.06	1,703,585.51	39.77531113	-80.77517328	
4,600.00	13.50	96.35	4,561.26	-112.71	401.71	14,444,993.48	1,703,608.71	39.77530388	-80.77509073	



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	North Reference:	Grid
Well:	Bryan N-13HU (slot E)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,700.00	13.50	96.35	4,658.49	-115.29	424.91	14,444,990.90	1,703,631.91	39.77529663	-80.77500818
4,800.00	13.50	96.35	4,755.73	-117.87	448.11	14,444,988.32	1,703,655.12	39.77528938	-80.77492562
4,900.00	13.50	96.35	4,852.97	-120.45	471.31	14,444,985.74	1,703,678.32	39.77528213	-80.77484307
5,000.00	13.50	96.35	4,950.20	-123.04	494.52	14,444,983.15	1,703,701.52	39.77527488	-80.77476052
5,100.00	13.50	96.35	5,047.44	-125.62	517.72	14,444,980.57	1,703,724.72	39.77526763	-80.77467797
5,200.00	13.50	96.35	5,144.68	-128.20	540.92	14,444,977.99	1,703,747.92	39.77526038	-80.77459541
5,300.00	13.50	96.35	5,241.92	-130.78	564.12	14,444,975.41	1,703,771.12	39.77525313	-80.77451286
5,400.00	13.50	96.35	5,339.15	-133.36	587.32	14,444,972.83	1,703,794.32	39.77524587	-80.77443031
5,500.00	13.50	96.35	5,436.39	-135.95	610.52	14,444,970.24	1,703,817.52	39.77523862	-80.77434775
5,600.00	13.50	96.35	5,533.63	-138.53	633.72	14,444,967.66	1,703,840.73	39.77523137	-80.77426520
5,700.00	13.50	96.35	5,630.86	-141.11	656.92	14,444,965.08	1,703,863.93	39.77522412	-80.77418265
5,800.00	13.50	96.35	5,728.10	-143.69	680.13	14,444,962.50	1,703,887.13	39.77521687	-80.77410010
5,873.94	13.50	96.35	5,800.00	-145.60	697.28	14,444,960.59	1,703,904.28	39.77521151	-80.77403905
Begin 2°/100' drop									
5,900.00	12.98	96.35	5,825.37	-146.26	703.21	14,444,959.93	1,703,910.22	39.77520965	-80.77401795
6,000.00	10.98	96.35	5,923.18	-148.56	723.84	14,444,957.63	1,703,930.84	39.77520321	-80.77394456
6,100.00	8.98	96.35	6,021.66	-150.47	741.06	14,444,955.72	1,703,948.06	39.77519782	-80.77388328
6,200.00	6.98	96.35	6,120.69	-152.01	754.86	14,444,954.18	1,703,961.86	39.77519351	-80.77383420
6,300.00	4.98	96.35	6,220.14	-153.16	765.21	14,444,953.03	1,703,972.21	39.77519028	-80.77379737
6,400.00	2.98	96.35	6,319.90	-153.93	772.10	14,444,952.26	1,703,979.11	39.77518812	-80.77377283
6,500.00	0.98	96.35	6,419.83	-154.31	775.53	14,444,951.88	1,703,982.54	39.77518705	-80.77376062
6,548.94	0.00	96.35	6,468.77	-154.36	775.95	14,444,951.83	1,703,982.95	39.77518692	-80.77375914
Begin vertical hold									
6,600.00	0.00	0.00	6,519.83	-154.36	775.95	14,444,951.83	1,703,982.95	39.77518692	-80.77375914
6,700.00	0.00	0.00	6,619.83	-154.36	775.95	14,444,951.83	1,703,982.95	39.77518692	-80.77375914
6,800.00	0.00	96.35	6,719.83	-154.36	775.95	14,444,951.83	1,703,982.95	39.77518692	-80.77375914
6,900.00	0.00	0.00	6,819.83	-154.36	775.95	14,444,951.83	1,703,982.95	39.77518692	-80.77375914
7,000.00	0.00	96.35	6,919.83	-154.36	775.95	14,444,951.83	1,703,982.95	39.77518692	-80.77375914
7,080.17	0.00	96.35	7,000.00	-154.36	775.95	14,444,951.83	1,703,982.95	39.77518692	-80.77375914
Begin 2°/100' build									
7,100.00	0.40	90.39	7,019.83	-154.36	776.02	14,444,951.83	1,703,983.02	39.77518692	-80.77375890
7,200.00	2.40	90.39	7,119.79	-154.37	778.46	14,444,951.82	1,703,985.46	39.77518685	-80.77375022
7,300.00	4.40	90.39	7,219.61	-154.41	784.38	14,444,951.78	1,703,991.38	39.77518670	-80.77372914
7,400.00	6.40	90.39	7,319.17	-154.48	793.78	14,444,951.71	1,704,000.79	39.77518646	-80.77369567
7,500.00	8.40	90.39	7,418.33	-154.56	806.66	14,444,951.63	1,704,013.66	39.77518613	-80.77364985
7,600.00	10.40	90.39	7,516.98	-154.67	822.98	14,444,951.52	1,704,029.99	39.77518572	-80.77359175
7,700.00	12.40	90.39	7,615.01	-154.81	842.74	14,444,951.38	1,704,049.74	39.77518521	-80.77352143
7,800.00	14.40	90.39	7,712.28	-154.96	865.91	14,444,951.22	1,704,072.91	39.77518462	-80.77343898
7,900.00	16.40	90.39	7,808.69	-155.14	892.46	14,444,951.04	1,704,099.46	39.77518394	-80.77334449
7,976.03	17.92	90.39	7,881.33	-155.30	914.88	14,444,950.89	1,704,121.89	39.77518337	-80.77326467
Begin 17.92° tangent									
8,000.00	17.92	90.39	7,904.14	-155.35	922.26	14,444,950.84	1,704,129.26	39.77518318	-80.77323843
8,100.00	17.92	90.39	7,999.29	-155.55	953.02	14,444,950.63	1,704,160.02	39.77518240	-80.77312894
8,200.00	17.92	90.39	8,094.44	-155.76	983.78	14,444,950.43	1,704,190.79	39.77518161	-80.77301945
8,300.00	17.92	90.39	8,189.59	-155.97	1,014.55	14,444,950.22	1,704,221.55	39.77518082	-80.77290996
8,400.00	17.92	90.39	8,284.74	-156.18	1,045.31	14,444,950.01	1,704,252.31	39.77518004	-80.77280047
8,500.00	17.92	90.39	8,379.89	-156.39	1,076.08	14,444,949.80	1,704,283.08	39.77517925	-80.77269098
8,600.00	17.92	90.39	8,475.04	-156.60	1,106.84	14,444,949.59	1,704,313.84	39.77517846	-80.77258149
8,700.00	17.92	90.39	8,570.19	-156.80	1,137.60	14,444,949.38	1,704,344.61	39.77517768	-80.77247200
8,800.00	17.92	90.39	8,665.34	-157.01	1,168.37	14,444,949.18	1,704,375.37	39.77517689	-80.77236251
8,900.00	17.92	90.39	8,760.49	-157.22	1,199.13	14,444,948.97	1,704,406.13	39.77517610	-80.77225303
9,000.00	17.92	90.39	8,855.64	-157.43	1,229.89	14,444,948.76	1,704,436.90	39.77517532	-80.77214354
9,100.00	17.92	90.39	8,950.79	-157.64	1,260.66	14,444,948.55	1,704,467.66	39.77517453	-80.77203405
9,200.00	17.92	90.39	9,045.94	-157.85	1,291.42	14,444,948.34	1,704,498.42	39.77517374	-80.77192456



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	North Reference:	Grid
Well:	Bryan N-13HU (slot E)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,300.00	17.92	90.39	9,141.09	-158.05	1,322.18	14,444,948.13	1,704,529.19	39.77517295	-80.77181507
9,400.00	17.92	90.39	9,236.24	-158.26	1,352.95	14,444,947.93	1,704,559.95	39.77517217	-80.77170558
9,500.00	17.92	90.39	9,331.39	-158.47	1,383.71	14,444,947.72	1,704,590.71	39.77517138	-80.77159609
9,600.00	17.92	90.39	9,426.54	-158.68	1,414.48	14,444,947.51	1,704,621.48	39.77517059	-80.77148660
9,700.00	17.92	90.39	9,521.69	-158.89	1,445.24	14,444,947.30	1,704,652.24	39.77516980	-80.77137711
9,800.00	17.92	90.39	9,616.84	-159.10	1,476.00	14,444,947.09	1,704,683.01	39.77516902	-80.77126762
9,900.00	17.92	90.39	9,711.99	-159.30	1,506.77	14,444,946.88	1,704,713.77	39.77516823	-80.77115813
10,000.00	17.92	90.39	9,807.14	-159.51	1,537.53	14,444,946.68	1,704,744.53	39.77516744	-80.77104864
10,100.00	17.92	90.39	9,902.29	-159.72	1,568.29	14,444,946.47	1,704,775.30	39.77516665	-80.77093915
10,200.00	17.92	90.39	9,997.44	-159.93	1,599.06	14,444,946.26	1,704,806.06	39.77516586	-80.77082967
10,300.00	17.92	90.39	10,092.59	-160.14	1,629.82	14,444,946.05	1,704,836.82	39.77516507	-80.77072018
10,400.00	17.92	90.39	10,187.74	-160.35	1,660.59	14,444,945.84	1,704,867.59	39.77516429	-80.77061069
10,425.86	17.92	90.39	10,212.35	-160.40	1,668.54	14,444,945.79	1,704,875.54	39.77516408	-80.77058237
Begin 6°/100' build/tum									
10,500.00	16.24	76.31	10,283.25	-158.02	1,690.03	14,444,948.17	1,704,897.03	39.77517046	-80.77050588
10,600.00	15.73	54.48	10,379.47	-146.83	1,714.66	14,444,959.36	1,704,921.67	39.77520103	-80.77041809
10,700.00	17.36	34.07	10,475.41	-126.58	1,734.07	14,444,979.61	1,704,941.07	39.77525650	-80.77034883
10,800.00	20.63	18.51	10,570.01	-97.49	1,748.04	14,445,008.70	1,704,955.04	39.77533628	-80.77029887
10,900.00	24.89	7.55	10,662.24	-59.89	1,756.40	14,445,046.30	1,704,963.41	39.77543949	-80.77026874
11,000.00	29.73	359.79	10,751.09	-14.19	1,759.08	14,445,092.00	1,704,966.09	39.77556499	-80.77025879
11,100.00	34.91	354.09	10,835.59	39.12	1,756.05	14,445,145.31	1,704,963.05	39.77571141	-80.77026911
11,200.00	40.29	349.72	10,914.81	99.45	1,747.32	14,445,205.64	1,704,954.33	39.77587715	-80.77029960
11,300.00	45.80	346.24	10,987.88	166.14	1,733.01	14,445,272.33	1,704,940.02	39.77606039	-80.77034992
11,375.22	50.00	344.02	11,038.30	220.05	1,718.66	14,445,326.24	1,704,925.66	39.77620855	-80.77040052
Begin 8°/100' build/tum									
11,400.00	51.86	343.14	11,053.92	238.50	1,713.22	14,445,344.69	1,704,920.22	39.77625927	-80.77041972
11,500.00	59.42	339.98	11,110.32	316.71	1,687.03	14,445,422.90	1,704,894.03	39.77647423	-80.77051222
11,600.00	67.05	337.28	11,155.32	399.76	1,654.45	14,445,505.95	1,704,861.45	39.77670254	-80.77062741
11,700.00	74.72	334.87	11,188.04	486.04	1,616.12	14,445,592.23	1,704,823.12	39.77693975	-80.77076305
11,800.00	82.42	332.63	11,207.85	573.86	1,572.78	14,445,680.05	1,704,779.78	39.77718125	-80.77091651
11,900.00	90.12	330.47	11,214.35	661.53	1,525.28	14,445,767.72	1,704,732.28	39.77742233	-80.77108479
11,924.36	92.00	329.95	11,213.90	682.66	1,513.18	14,445,788.85	1,704,720.18	39.77748046	-80.77112766
Begin 92.00° lateral									
12,000.00	92.00	329.95	11,211.26	748.10	1,475.32	14,445,854.29	1,704,682.33	39.77766042	-80.77126180
12,100.00	92.00	329.95	11,207.77	834.60	1,425.28	14,445,940.79	1,704,632.28	39.77789834	-80.77143913
12,200.00	92.00	329.95	11,204.28	921.11	1,375.23	14,446,027.30	1,704,582.23	39.77813626	-80.77161647
12,300.00	92.00	329.95	11,200.79	1,007.61	1,325.19	14,446,113.80	1,704,532.19	39.77837418	-80.77179381
12,400.00	92.00	329.95	11,197.30	1,094.12	1,275.14	14,446,200.31	1,704,482.14	39.77861210	-80.77197115
12,500.00	92.00	329.95	11,193.81	1,180.63	1,225.10	14,446,286.82	1,704,432.10	39.77885002	-80.77214850
12,600.00	92.00	329.95	11,190.32	1,267.13	1,175.05	14,446,373.32	1,704,382.05	39.77908794	-80.77232584
12,700.00	92.00	329.95	11,186.83	1,353.64	1,125.00	14,446,459.83	1,704,332.01	39.77932586	-80.77250319
12,800.00	92.00	329.95	11,183.34	1,440.14	1,074.96	14,446,546.33	1,704,281.96	39.77956378	-80.77268053
12,900.00	92.00	329.95	11,179.85	1,526.65	1,024.91	14,446,632.84	1,704,231.92	39.77980170	-80.77285788
13,000.00	92.00	329.95	11,176.36	1,613.16	974.87	14,446,719.35	1,704,181.87	39.78003961	-80.77303523
13,100.00	92.00	329.95	11,172.87	1,699.66	924.82	14,446,805.85	1,704,131.83	39.78027753	-80.77321258
13,200.00	92.00	329.95	11,169.38	1,786.17	874.78	14,446,892.36	1,704,081.78	39.78051545	-80.77338993
13,300.00	92.00	329.95	11,165.89	1,872.67	824.73	14,446,978.86	1,704,031.73	39.78075336	-80.77356728
13,400.00	92.00	329.95	11,162.40	1,959.18	774.69	14,447,065.37	1,703,981.69	39.78099128	-80.77374463
13,500.00	92.00	329.95	11,158.91	2,045.69	724.64	14,447,151.87	1,703,931.64	39.78122920	-80.77392199
13,600.00	92.00	329.95	11,155.42	2,132.19	674.60	14,447,238.38	1,703,881.60	39.78146711	-80.77409935
13,700.00	92.00	329.95	11,151.93	2,218.70	624.55	14,447,324.89	1,703,831.55	39.78170503	-80.77427670
13,800.00	92.00	329.95	11,148.44	2,305.20	574.50	14,447,411.39	1,703,781.51	39.78194294	-80.77445406
13,900.00	92.00	329.95	11,144.95	2,391.71	524.46	14,447,497.90	1,703,731.46	39.78218086	-80.77463142
14,000.00	92.00	329.95	11,141.46	2,478.21	474.41	14,447,584.40	1,703,681.42	39.78241877	-80.77480878



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	North Reference:	Grid
Well:	Bryan N-13HU (slot E)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
14,100.00	92.00	329.95	11,137.97	2,564.72	424.37	14,447,670.91	1,703,631.37	39.78265669	-80.77498614
14,200.00	92.00	329.95	11,134.48	2,651.23	374.32	14,447,757.42	1,703,581.32	39.78289460	-80.77516351
14,300.00	92.00	329.95	11,130.99	2,737.73	324.28	14,447,843.92	1,703,531.28	39.78313252	-80.77534087
14,400.00	92.00	329.95	11,127.50	2,824.24	274.23	14,447,930.43	1,703,481.23	39.78337043	-80.77551824
14,500.00	92.00	329.95	11,124.01	2,910.74	224.19	14,448,016.93	1,703,431.19	39.78360834	-80.77569560
14,600.00	92.00	329.95	11,120.52	2,997.25	174.14	14,448,103.44	1,703,381.14	39.78384626	-80.77587297
14,700.00	92.00	329.95	11,117.03	3,083.76	124.09	14,448,189.95	1,703,331.10	39.78408417	-80.77605034
14,800.00	92.00	329.95	11,113.54	3,170.26	74.05	14,448,276.45	1,703,281.05	39.78432208	-80.77622771
14,900.00	92.00	329.95	11,110.05	3,256.77	24.00	14,448,362.96	1,703,231.01	39.78455999	-80.77640509
15,000.00	92.00	329.95	11,106.56	3,343.27	-26.04	14,448,449.46	1,703,180.96	39.78479791	-80.77658246
15,100.00	92.00	329.95	11,103.07	3,429.78	-76.09	14,448,535.97	1,703,130.92	39.78503582	-80.77675983
15,200.00	92.00	329.95	11,099.58	3,516.29	-126.13	14,448,622.47	1,703,080.87	39.78527373	-80.77693721
15,300.00	92.00	329.95	11,096.09	3,602.79	-176.18	14,448,708.98	1,703,030.82	39.78551164	-80.77711458
15,400.00	92.00	329.95	11,092.60	3,689.30	-226.22	14,448,795.49	1,702,980.78	39.78574955	-80.77729196
15,500.00	92.00	329.95	11,089.11	3,775.80	-276.27	14,448,881.99	1,702,930.73	39.78598746	-80.77746934
15,600.00	92.00	329.95	11,085.62	3,862.31	-326.31	14,448,968.50	1,702,880.69	39.78622537	-80.77764672
15,700.00	92.00	329.95	11,082.13	3,948.82	-376.36	14,449,055.00	1,702,830.64	39.78646328	-80.77782410
15,800.00	92.00	329.95	11,078.64	4,035.32	-426.41	14,449,141.51	1,702,780.60	39.78670119	-80.77800149
15,900.00	92.00	329.95	11,075.15	4,121.83	-476.45	14,449,228.02	1,702,730.55	39.78693910	-80.77817887
16,000.00	92.00	329.95	11,071.66	4,208.33	-526.50	14,449,314.52	1,702,680.51	39.78717701	-80.77835626
16,100.00	92.00	329.95	11,068.17	4,294.84	-576.54	14,449,401.03	1,702,630.46	39.78741492	-80.77853364
16,200.00	92.00	329.95	11,064.68	4,381.34	-626.59	14,449,487.53	1,702,580.41	39.78765283	-80.77871103
16,300.00	92.00	329.95	11,061.19	4,467.85	-676.63	14,449,574.04	1,702,530.37	39.78789074	-80.77888842
16,400.00	92.00	329.95	11,057.70	4,554.36	-726.68	14,449,660.55	1,702,480.32	39.78812864	-80.77906581
16,500.00	92.00	329.95	11,054.21	4,640.86	-776.72	14,449,747.05	1,702,430.28	39.78836655	-80.77924320
16,600.00	92.00	329.95	11,050.72	4,727.37	-826.77	14,449,833.56	1,702,380.23	39.78860446	-80.77942059
16,700.00	92.00	329.95	11,047.23	4,813.87	-876.82	14,449,920.06	1,702,330.19	39.78884237	-80.77959799
16,800.00	92.00	329.95	11,043.74	4,900.38	-926.86	14,450,006.57	1,702,280.14	39.78908027	-80.77977538
16,900.00	92.00	329.95	11,040.25	4,986.89	-976.91	14,450,093.07	1,702,230.10	39.78931818	-80.77995278
17,000.00	92.00	329.95	11,036.76	5,073.39	-1,026.95	14,450,179.58	1,702,180.05	39.78955609	-80.78013018
17,100.00	92.00	329.95	11,033.27	5,159.90	-1,077.00	14,450,266.09	1,702,130.01	39.78979399	-80.78030758
17,200.00	92.00	329.95	11,029.78	5,246.40	-1,127.04	14,450,352.59	1,702,079.96	39.79003190	-80.78048498
17,300.00	92.00	329.95	11,026.29	5,332.91	-1,177.09	14,450,439.10	1,702,029.91	39.79026981	-80.78066238
17,400.00	92.00	329.95	11,022.80	5,419.42	-1,227.13	14,450,525.60	1,701,979.87	39.79050771	-80.78083978
17,500.00	92.00	329.95	11,019.31	5,505.92	-1,277.18	14,450,612.11	1,701,929.82	39.79074562	-80.78101718
17,600.00	92.00	329.95	11,015.82	5,592.43	-1,327.22	14,450,698.62	1,701,879.78	39.79098352	-80.78119459
17,700.00	92.00	329.95	11,012.33	5,678.93	-1,377.27	14,450,785.12	1,701,829.73	39.79122143	-80.78137199
17,800.00	92.00	329.95	11,008.84	5,765.44	-1,427.32	14,450,871.63	1,701,779.69	39.79145933	-80.78154940
17,900.00	92.00	329.95	11,005.35	5,851.94	-1,477.36	14,450,958.13	1,701,729.64	39.79169723	-80.78172681
18,000.00	92.00	329.95	11,001.86	5,938.45	-1,527.41	14,451,044.64	1,701,679.60	39.79193514	-80.78190422
18,100.00	92.00	329.95	10,998.37	6,024.96	-1,577.45	14,451,131.15	1,701,629.55	39.79217304	-80.78208163
18,200.00	92.00	329.95	10,994.88	6,111.46	-1,627.50	14,451,217.65	1,701,579.50	39.79241094	-80.78225904
18,300.00	92.00	329.95	10,991.39	6,197.97	-1,677.54	14,451,304.16	1,701,529.46	39.79264885	-80.78243646
18,400.00	92.00	329.95	10,987.90	6,284.47	-1,727.59	14,451,390.66	1,701,479.41	39.79288675	-80.78261387
18,500.00	92.00	329.95	10,984.41	6,370.98	-1,777.63	14,451,477.17	1,701,429.37	39.79312465	-80.78279129
18,600.00	92.00	329.95	10,980.92	6,457.49	-1,827.68	14,451,563.67	1,701,379.32	39.79336255	-80.78296870
18,700.00	92.00	329.95	10,977.43	6,543.99	-1,877.73	14,451,650.18	1,701,329.28	39.79360046	-80.78314612
18,800.00	92.00	329.95	10,973.94	6,630.50	-1,927.77	14,451,736.69	1,701,279.23	39.79383836	-80.78332354
18,900.00	92.00	329.95	10,970.45	6,717.00	-1,977.82	14,451,823.19	1,701,229.19	39.79407626	-80.78350096
19,000.00	92.00	329.95	10,966.96	6,803.51	-2,027.86	14,451,909.70	1,701,179.14	39.79431416	-80.78367838
19,100.00	92.00	329.95	10,963.47	6,890.02	-2,077.91	14,451,996.20	1,701,129.10	39.79455206	-80.78385581
19,200.00	92.00	329.95	10,959.98	6,976.52	-2,127.95	14,452,082.71	1,701,079.05	39.79478996	-80.78403323
19,300.00	92.00	329.95	10,956.49	7,063.03	-2,178.00	14,452,169.22	1,701,029.00	39.79502786	-80.78421066
19,400.00	92.00	329.95	10,953.00	7,149.53	-2,228.04	14,452,255.72	1,700,978.96	39.79526576	-80.78438808
19,500.00	92.00	329.95	10,949.51	7,236.04	-2,278.09	14,452,342.23	1,700,928.91	39.79550366	-80.78456551



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	North Reference:	Grid
Well:	Bryan N-13HU (slot E)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
19,600.00	92.00	329.95	10,946.02	7,322.54	-2,328.13	14,452,428.73	1,700,878.87	39.79574156	-80.78474294
19,700.00	92.00	329.95	10,942.53	7,409.05	-2,378.18	14,452,515.24	1,700,828.82	39.79597946	-80.78492037
19,800.00	92.00	329.95	10,939.04	7,495.56	-2,428.23	14,452,601.75	1,700,778.78	39.79621736	-80.78509780
19,900.00	92.00	329.95	10,935.55	7,582.06	-2,478.27	14,452,688.25	1,700,728.73	39.79645525	-80.78527523
20,000.00	92.00	329.95	10,932.06	7,668.57	-2,528.32	14,452,774.76	1,700,678.69	39.79669315	-80.78545267
20,100.00	92.00	329.95	10,928.57	7,755.07	-2,578.36	14,452,861.26	1,700,628.64	39.79693105	-80.78563010
20,200.00	92.00	329.95	10,925.08	7,841.58	-2,628.41	14,452,947.77	1,700,578.60	39.79716895	-80.78580754
20,300.00	92.00	329.95	10,921.59	7,928.09	-2,678.45	14,453,034.28	1,700,528.55	39.79740685	-80.78598498
20,400.00	92.00	329.95	10,918.10	8,014.59	-2,728.50	14,453,120.78	1,700,478.50	39.79764474	-80.78616242
20,500.00	92.00	329.95	10,914.61	8,101.10	-2,778.54	14,453,207.29	1,700,428.46	39.79788264	-80.78633986
20,600.00	92.00	329.95	10,911.12	8,187.60	-2,828.59	14,453,293.79	1,700,378.41	39.79812054	-80.78651730
20,700.00	92.00	329.95	10,907.63	8,274.11	-2,878.64	14,453,380.30	1,700,328.37	39.79835843	-80.78669474
20,800.00	92.00	329.95	10,904.14	8,360.62	-2,928.68	14,453,466.80	1,700,278.32	39.79859633	-80.78687219
20,900.00	92.00	329.95	10,900.65	8,447.12	-2,978.73	14,453,553.31	1,700,228.28	39.79883422	-80.78704963
21,000.00	92.00	329.95	10,897.16	8,533.63	-3,028.77	14,453,639.82	1,700,178.23	39.79907212	-80.78722708
21,100.00	92.00	329.95	10,893.67	8,620.13	-3,078.82	14,453,726.32	1,700,128.19	39.79931001	-80.78740452
21,200.00	92.00	329.95	10,890.18	8,706.64	-3,128.86	14,453,812.83	1,700,078.14	39.79954791	-80.78758197
21,300.00	92.00	329.95	10,886.69	8,793.14	-3,178.91	14,453,899.33	1,700,028.09	39.79978580	-80.78775942
21,400.00	92.00	329.95	10,883.20	8,879.65	-3,228.95	14,453,985.84	1,699,978.05	39.80002370	-80.78793687
21,500.00	92.00	329.95	10,879.71	8,966.16	-3,279.00	14,454,072.35	1,699,928.00	39.80026159	-80.78811433
21,600.00	92.00	329.95	10,876.22	9,052.66	-3,329.04	14,454,158.85	1,699,877.96	39.80049948	-80.78829178
21,700.00	92.00	329.95	10,872.73	9,139.17	-3,379.09	14,454,245.36	1,699,827.91	39.80073738	-80.78846924
21,800.00	92.00	329.95	10,869.24	9,225.67	-3,429.14	14,454,331.86	1,699,777.87	39.80097527	-80.78864669
21,900.00	92.00	329.95	10,865.75	9,312.18	-3,479.18	14,454,418.37	1,699,727.82	39.80121316	-80.78882415
22,000.00	92.00	329.95	10,862.26	9,398.69	-3,529.23	14,454,504.88	1,699,677.78	39.80145106	-80.78900161
22,100.00	92.00	329.95	10,858.77	9,485.19	-3,579.27	14,454,591.38	1,699,627.73	39.80168895	-80.78917907
22,200.00	92.00	329.95	10,855.28	9,571.70	-3,629.32	14,454,677.89	1,699,577.69	39.80192684	-80.78935653
22,300.00	92.00	329.95	10,851.79	9,658.20	-3,679.36	14,454,764.39	1,699,527.64	39.80216473	-80.78953399
22,400.00	92.00	329.95	10,848.30	9,744.71	-3,729.41	14,454,850.90	1,699,477.59	39.80240262	-80.78971145
22,500.00	92.00	329.95	10,844.81	9,831.22	-3,779.45	14,454,937.40	1,699,427.55	39.80264052	-80.78988892
22,600.00	92.00	329.95	10,841.32	9,917.72	-3,829.50	14,455,023.91	1,699,377.50	39.80287841	-80.79006638
22,700.00	92.00	329.95	10,837.83	10,004.23	-3,879.54	14,455,110.42	1,699,327.46	39.80311630	-80.79024385
22,800.00	92.00	329.95	10,834.34	10,090.73	-3,929.59	14,455,196.92	1,699,277.41	39.80335419	-80.79042132
22,900.00	92.00	329.95	10,830.85	10,177.24	-3,979.64	14,455,283.43	1,699,227.37	39.80359208	-80.79059879
22,924.35	92.00	329.95	10,830.00	10,198.30	-3,991.82	14,455,304.49	1,699,215.18	39.80365000	-80.79064200
PBHL/TD 22924.35 MD/10830.00 TVD									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
BHL Bryan N-13HU r3 - hit/miss target - Shape - Point	0.00	0.01	10,830.00	10,198.30	-3,991.82	14,455,304.49	1,699,215.18	39.80365000	-80.79064200
LP Bryan N-13HU - plan misses target center by 67.43usft at 11622.76usft MD (11163.88 TVD, 419.17 N, 1646.21 E) - Point	0.00	0.00	11,225.00	407.56	1,672.21	14,445,513.75	1,704,879.21	39.77672384	-80.77056413



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	North Reference:	Grid
Well:	Bryan N-13HU (slot E)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,100.00	1,100.00	0.00	0.00	KOP Begin 1°/100' build
1,450.00	1,449.78	-6.87	8.19	Begin 3.50° tangent
3,003.11	3,000.00	-67.82	80.82	Begin 2°/100' build/turn
3,541.09	3,531.60	-85.37	156.03	Begin 13.50° tangent
5,873.94	5,800.00	-145.60	697.28	Begin 2°/100' drop
6,548.94	6,468.77	-154.36	775.95	Begin vertical hold
7,080.17	7,000.00	-154.36	775.95	Begin 2°/100' build
7,976.03	7,881.33	-155.30	914.88	Begin 17.92° tangent
10,425.86	10,212.35	-160.40	1,668.54	Begin 6°/100' build/turn
11,375.22	11,038.30	220.05	1,718.66	Begin 8°/100' build/turn
11,924.36	11,213.90	682.66	1,513.18	Begin 92.00° lateral
22,924.35	10,830.00	10,198.30	-3,991.82	PBHL/TD 22924.35 MD/10830.00 TVD

Area of Review

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

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

Data Sources Reviewed:

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

Contacted Devin Ducoeur 724-705-0444, dducoeur@dpslandservices.com DPS GIS (07/31/2019) to have him make maps of the wellbores with his information. DPS utilizes WVGES maps for their mapping seems it as the best publicly available. See attached map he provided.

Request maps for:

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

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

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

Permit well - Bryan N-13HU

Wells within 500' Buffer

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

API Number	Operator Name	Total Depth	Perforated Fms	Producing zones not perforated	Is this well "known or reasonably expected to penetrate a depth that could be within the range of Fracture propagation"? 1000' is max limit I would assign to wells that might be within in range of fracture propagation	Comments
4705101340	Tug Hill Operating (formerly operated by Chevron and AB Resources)	6450' TVD 10601' MD	Marcellus	Unknown	Yes, existing Marcellus producer. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore	Producing Marcellus horizontal well. A field survey was conducted to locate this well and it was found producing at the location shown on the well plat.
4705102022 4705101979 4705101978 4705101977 4705102077 4705101980 4705102006 4705102076 4705101999	Tug Hill Operating	n/a	None	None	No, Permit submitted Marcellus well	Permit submitted Marcellus well. Not yet drilled

WV Geological & Economic Survey

Well: County = 51 Permit = 01340

Location Information: [View Map](#)

API: COUNTY PERMIT TAX_DISTRICT QUAD_F6 QUAD_16 LAT_DD LONG_DD UTM_E UTM_N
 4705101340 Marshall 1245 Francon Postoffice Range 01a-01a 25 77452 -32 77011 11010 7 44523 93.6

Bottom Hole Location Information:
 API: TYP FLG0 UTM_E UTM_N LONG_DD LAT_DD
 4705101340 1 As Proposed 215611.4 442402.3 -32 73505 20 -02 01

Owner Information:
 API: CMP_ID SURFID STATUS SURFACE_OWNER WELL_NUM CO_NUM LEASE LEASE_NUM MINERAL_OWN OPERATOR_A1_COMPLETION PROP_VD PROP_TYD_FM TYM_EST_PH
 4705101340 41-0210 Dred Opn/Lea Completed CHE Leas Resources Inc 101 Ryan Mcneer & Emery Eng'g AS Resources PA 6320 Marcellus SH

Completion Information:
 API: CMP_ID SPUD_ID ELEV DATUM FIELD DEEPEST_FM DEEPEST_FHT INITIAL_CLASS FINAL_CLASS TYPE RIG CMP_MTHD TVD ESD NEW_FTO O_BEF O_AFT O_BEF O_AFT NGL_BEF NGL_AFT P_BEF
 4705101340 41-0210 011-0210 1217 Salt Sulphur Unperforated Marcellus SH Marcellus SH Development Well Oil and Gas Rotary Fractured 6435 10551 10001 0 4217 0 285
 Comment: 4/17/2010 Kick off point at 5966

Pay/Show Water Information:
 API: CMP_ID ACTIVITY PRODUCT SECTION DEPTH_TOP FM_TOP DEPTH_BOT FM_BOT O_BEF O_AFT O_BEF O_AFT WATER_QNTY
 4705101340 41-0210 Water Salt Water Unflow 1430 Pennsylvania System
 4705101340 41-0210 Water Salt Water Unflow 1710 Wasequan
 4705101340 41-0210 Gas Oil & Gas Unflow 2532 Marcellus SH 12000 Marcellus SH

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4705101340	AB Resources PA	2010	0	0	0	0	0	0	0	0	0	0	0	0	0
4705101340	Chevron Appalachia, LLC	2011	256,480	0	0	0	0	0	24,667	61,892	73,189	62,316	53,105	0	0
4705101340	Chevron Appalachia, LLC	2012	0	0	0	0	0	0	0	0	0	0	0	0	0
4705101340	Chevron Appalachia, LLC	2013	202,873	11,211	0	0	0	0	2,627	49,828	55,262	16,120	47,422	41,933	83,827
4705101340	Chevron Appalachia, LLC	2014	27,740	42,813	42,328	20	0	0	1,255	239	0	0	0	0	0
4705101340	Chevron Appalachia, LLC	2015	44,427	0	0	5,223	22,426	12,097	22,708	23,394	27,363	27,840	26,344	26,441	23,172
4705101340	Chevron Appalachia, LLC	2016	451,014	42,412	41,924	47,423	42,220	41,728	43,253	43,425	41,822	15,132	41,418	42,823	24,227

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4705101340	AB Resources PA	2010	0	0	0	0	0	0	0	0	0	0	0	0	0
4705101340	Chevron Appalachia, LLC	2011	32,974	0	0	0	0	0	4,122	9,199	6,195	6,123	5,423	0	0
4705101340	Chevron Appalachia, LLC	2012	0	0	0	0	0	0	0	0	0	0	0	0	0
4705101340	Chevron Appalachia, LLC	2013	18,223	717	0	0	0	0	822	3,222	3,229	1,123	2,749	2,083	2,222
4705101340	Chevron Appalachia, LLC	2014	1,822	2,041	1,582	1,178	0	0	188	49	0	0	173	0	0
4705101340	Chevron Appalachia, LLC	2015	17,718	0	0	3	643	2,042	1,323	2,272	2,587	2,125	1,723	1,462	1,182
4705101340	Chevron Appalachia, LLC	2016	6,119	1,027	792	321	642	622	522	423	325	129	242	422	342

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4705101340	Chevron Appalachia, LLC	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4705101340	Chevron Appalachia, LLC	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4705101340	Chevron Appalachia, LLC	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4705101340	Chevron Appalachia, LLC	2016	0	0	0	0	0	0	0	0	0	0	0	0	0

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4705101340	Chevron Appalachia, LLC	2016	0	0	0	0	0	0	0	0	0	0	0	0	0

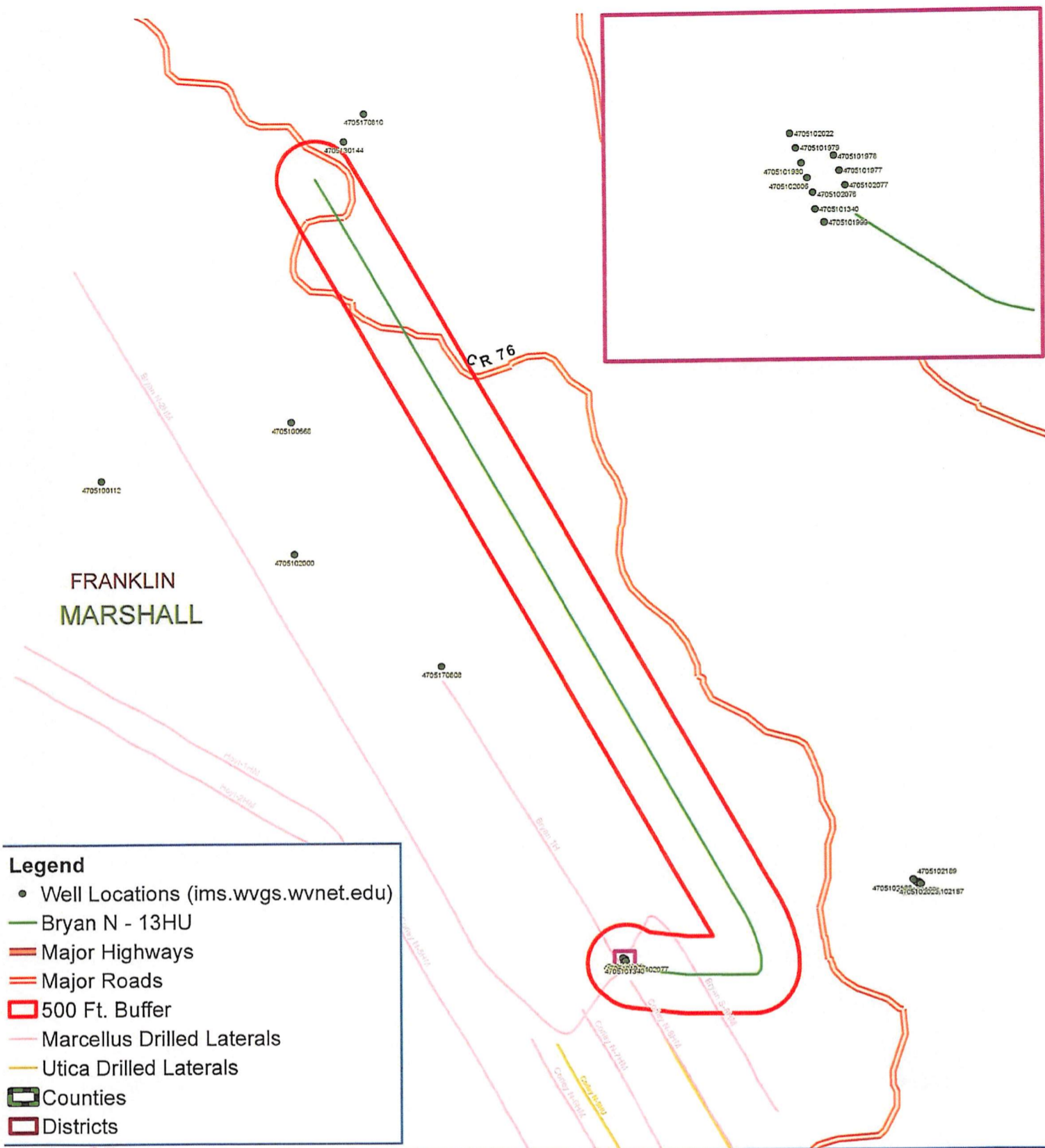
Stratigraphy Information:

API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_BOTTOM	THICKNESS	THICKNESS_QUALITY	ELEV DATUM
4705101340	Dred Opn/Lea	Summit	Well Record	5251	Reasonable	43	Reasonable	1217 Kelly Sulphur
4705101340	Dred Opn/Lea	Tully LS	Well Record	5373	Reasonable	32	Reasonable	1217 Kelly Sulphur
4705101340	Dred Opn/Lea	Hampton	Well Record	2414	Reasonable	42	Reasonable	1217 Kelly Sulphur
4705101340	Dred Opn/Lea	Marcellus SH	Well Record	2482	Reasonable	47	Reasonable	1217 Kelly Sulphur
4705101340	Dred Opn/Lea	Chaparral Le	Well Record	2514	Reasonable	23	Reasonable	1217 Kelly Sulphur

Wellbore (E-Log) Information:

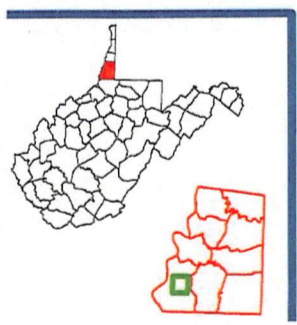
API	LOG_TOP	LOG_BOT	DEEPEST_FML	LOG1_AVAIL	SCAN	DIGITIZED	GR_TOP	GR_BOT	O_TOP	O_BOT	R_TOP	R_BOT	L_TOP	L_BOT	T_TOP	T_BOT	S_TOP	S_BOT	O_TOP	O_BOT	INCH3	INCH6	REDUCED	KOP	LOGSD	ELEV_WB
4705101340	60	9054	0.0	N/C	Y	N	52	3255	3745	3052	3242	3252									2942	9004	N	V	N	10621

Comment: Logs: caliper, tension, PE; LWD; G with measured and vertical depth included.



Legend

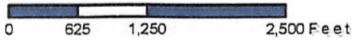
- Well Locations (ims.wvgs.wvnet.edu)
- Bryan N - 13HU
- Major Highways
- Major Roads
- ▭ 500 Ft. Buffer
- Marcellus Drilled Laterals
- Utica Drilled Laterals
- ▭ Counties
- ▭ Districts



Bryan N - 13HU

Franklin District

Marshall County, WV



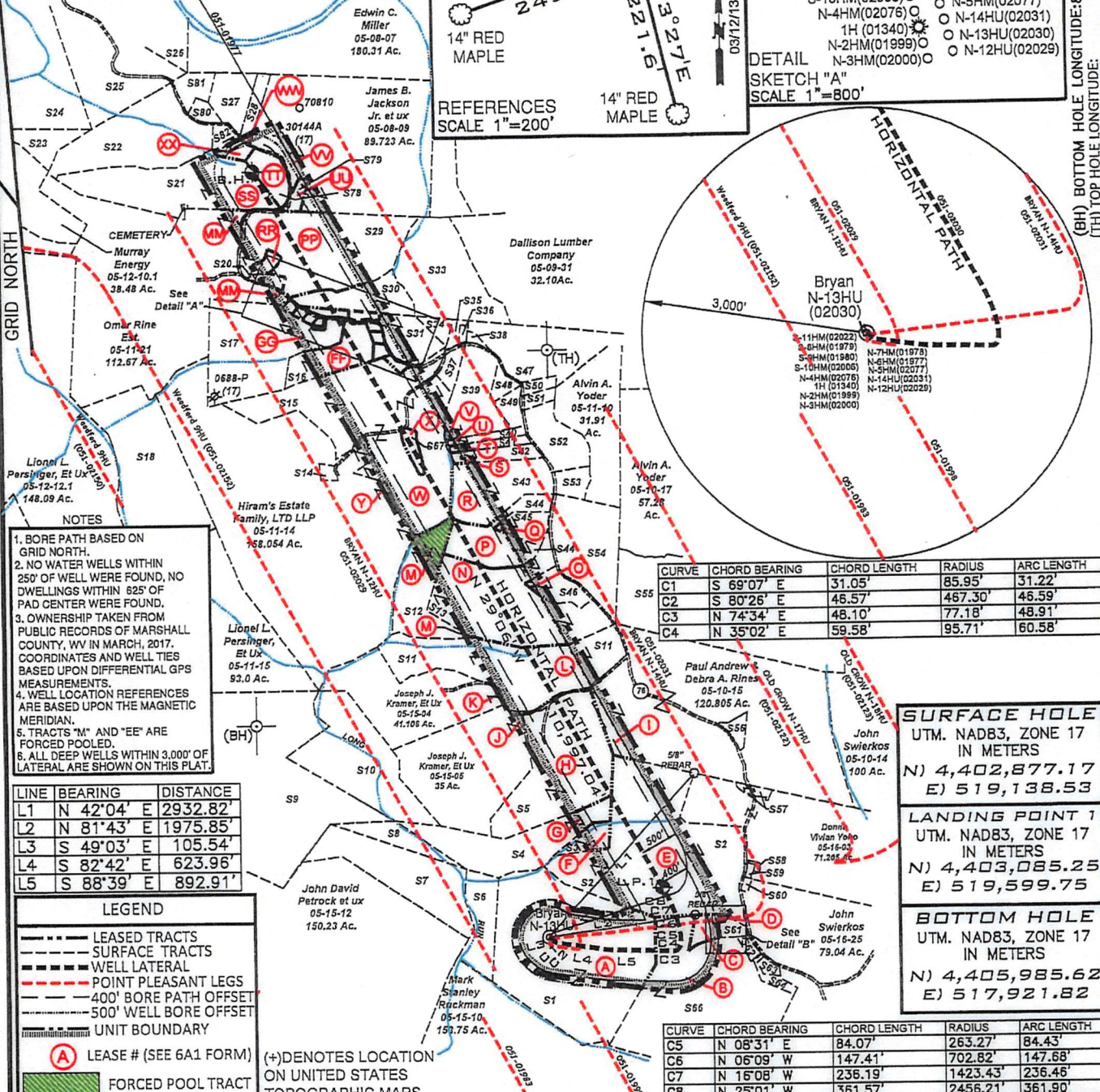
Notes:
All locations are approximate and are for visualization purposes only



Map Created: July 31, 2019

form: wv6

**BRYAN LEASE
UTICA UNIT - 397.0538 AC±
WELL N-13HU
TUG HILL OPERATING**



TOP HOLE LATITUDE: 39°47'30"
BOTTOM HOLE LATITUDE: 39°50'00"
S-11HM(02022) O
S-8HM(01979) O
S-9HM(01980) O
S-10HM(02008) O
N-4HM(02076) O
1H (01340)
N-2HM(01999) O
N-3HM(02000) O
N-7HM(01978) O
N-6HM(01977) O
N-5HM(02077) O
N-14HU(02031) O
N-13HU(02030) O
N-12HU(02029) O

REFERENCES
SCALE 1"=200'

DETAIL
SKETCH "A"
SCALE 1"=800'

- NOTES**
- BORE PATH BASED ON GRID NORTH.
 - NO WATER WELLS WITHIN 250' OF WELL WERE FOUND, NO DWELLINGS WITHIN 625' OF PAD CENTER WERE FOUND.
 - OWNERSHIP TAKEN FROM PUBLIC RECORDS OF MARSHALL COUNTY, WV IN MARCH, 2017. COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS.
 - WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.
 - TRACTS "M" AND "EE" ARE FORCED POOLED.
 - ALL DEEP WELLS WITHIN 3,000' OF LATERAL ARE SHOWN ON THIS PLAT.

LINE	BEARING	DISTANCE
L1	N 42°04' E	2932.82'
L2	N 81°43' E	1975.85'
L3	S 49°03' E	105.54'
L4	S 82°42' E	623.96'
L5	S 88°39' E	892.91'

LEGEND

- LEASE TRACTS
- SURFACE TRACTS
- WELL LATERAL
- POINT PLEASANT LEGS
- 400' BORE PATH OFFSET
- 500' WELL BORE OFFSET
- UNIT BOUNDARY
- LEASE # (SEE 6A1 FORM)
- FORCED POOL TRACT

CURVE	CHORD BEARING	CHORD LENGTH	RADIUS	ARC LENGTH
C1	S 69°07' E	31.05'	85.95'	31.22'
C2	S 80°26' E	45.57'	467.30'	46.59'
C3	N 74°34' E	48.10'	77.18'	48.91'
C4	N 35°02' E	59.58'	95.71'	60.58'

SURFACE HOLE
UTM. NAD83, ZONE 17
IN METERS
N) 4,402,877.17
E) 519,138.53

LANDING POINT 1
UTM. NAD83, ZONE 17
IN METERS
N) 4,403,085.25
E) 519,599.75

BOTTOM HOLE
UTM. NAD83, ZONE 17
IN METERS
N) 4,405,985.62
E) 517,921.82

CURVE	CHORD BEARING	CHORD LENGTH	RADIUS	ARC LENGTH
C5	N 08°31' E	84.07'	263.27'	84.43'
C6	N 06°09' W	147.41'	702.62'	147.68'
C7	N 16°08' W	236.19'	1423.43'	236.46'
C8	N 25°01' W	361.57'	2456.21'	361.90'

FILE NUMBER _____
DRAWING NUMBER BRYAN_N-13HU_REV 4
SCALE 1" = 2000'
MINIMUM DEGREE OF ACCURACY 1/200
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

David L Jackson



JACKSON SURVEYING INC.
P.O. Box 1480
Clarksburg, WV 26302
304-623-5851

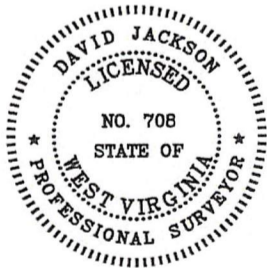
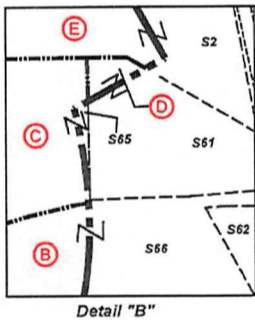
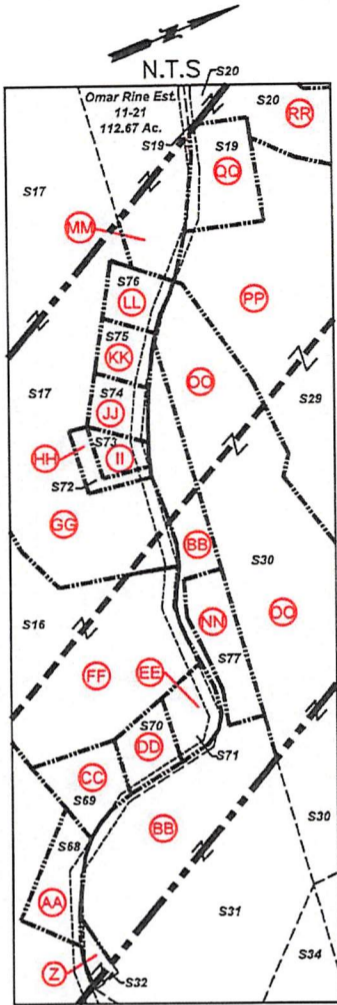
WVDEP
OFFICE OF OIL & GAS
601 57TH STREET, SE
CHARLESTON, WV 25304

DATE: DECEMBER 27, 2017
REVISED DATE: AUGUST 01, 2019
OPERATORS WELL NO. BRYAN N-13HU
API WELL NO. 47-051-02030
STATE WV COUNTY MARSHALL PERMIT 81.98

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP X SHALLOW ___
LOCATION ELEVATION 1191.0' WATERSHED (HUC 10) Fish Creek
DISTRICT Franklin COUNTY Marshall
QUADRANGLE Powhatan Point 7.5' LEASE NUMBER SEE WW-6A1 ROYALTY OWNERS
SURFACE OWNER CNX LAND RESOURCES, INC. ACREAGE 81.98
OIL & GAS ROYALTY OWNER MICHAEL R. BRYAN - SEE WW-6A1 ROYALTY OWNERS LEASE ACREAGE 81.98
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 Point Pleasant ESTIMATED DEPTH TVD: 11,433' TMD: 22,924'
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

COUNTY NAME PERMIT

**BRYAN LEASE
UTICA UNIT - 397.0538 AC±
WELL N-13HU
TUG HILL OPERATING**



P.S. 708 *David L Jackson*

Number	TAX MAP -PARCEL	SURFACE OWNER	ACRES
S1	A 05-15-9	CNX Land Resources, Inc.	81.98
S2	E 05-15-8	Terry D. Rose, et ux	77.1
S3	F 05-15-7	Terry D. Rose, et ux	4.5
S4	G 05-15-6.1	Joseph J. Kramar, et ux	39.40
S5	H 05-15-6	Joseph J. Kramar, et ux	42.5
S6	05-15-13	CNX Land Resources	11.0
S7	05-15-14	John David Petrock, et ux	25.0
S8	05-15-2	John David Petrock, et ux	5.0
S9	05-15-1	Marcus Sharp & David Schlabach	121.0
S10	05-15-3	Joseph J. Kramar, et ux	36.10
S11	L 05-11-12	Joseph J. Kramar, et ux	43.2188
S12	M 05-11-13	Joy D. Gartman & Arlin Gatts	12.29
S13	N 05-11-11.3	Herman D. & Herman J. Lantz	43.96
S14	05-11-14.1	Dennis F. Moore, et ux	1.056
S15	W 05-11-16	Keith E. Haught, et al	83.674
S16	FF 05-11-17.2	Brenda & Michael Bryan	11.504
S17	GG 05-11-17	Kevin R. Corley, et ux	36.13
S18	05-12-11	Wesley Bryan & Wesley Bryan II	52.478
S19	QQ 05-11-2.2	Joshua A. Myers	2.193
S20	RR 05-11-2.1	Walter C. & Cheryl A. Rine	1.19
S21	SS 05-11-1.1	Larry W. Dunlap, et al	34.405
S22	05-11-1.4	Larry W. Dunlap, et al	32.493
S23	05-12-9	Lionel & Mary Lee Persinger	10.15
S24	05-7-39	Lionel L. Persinger, et ux	57.0
S25	05-7-33	William N. Roupe	24.60
S26	05-7-31	William N. Roupe	43.147
S27	05-11-1.7	William S. & Mary K. Adams	8.0
S28	VVV 05-11-1.5	Paul White	3.507
S29	PP 05-11-2	Walter C. & Cheryl A. Rine	42.367
S30	OO 05-11-3	Kevin R. Corley, et al	13.18
S31	BB 05-11-5	Kevin R. Corley, et ux	10.36
S32	Z 05-11-5.1	James R. Anderson, et ux	0.205
S33	05-11-4	David H. Arrick, et ux	31.5
S34	05-11-5.3	Robert Harris Arrick, et ux	3.0
S35	05-11-6	Robert & Rebecca Arrick	1.29
S36	05-11-7	Baptist Cemetery	1.0
S37	05-11-16.3	Kegan Michael Haught - Life	3.265
S38	05-11-8	Baptist Church	0.8
S39	V 05-11-9.3	Joseph M. Haught & Steven Haught	16.3
S40	U 05-11-9.5	Southern Country Farms, Inc	2.559
S41	T 05-11-9.6	Southern Country Farms, Inc	2.488
S42	S 05-11-9.9	Leonard L. Parsons, et ux	5.89
S43	R 05-11-9	Edwin C. & Kimberly A. Miller	41.773
S44	P 05-11-11.4	Brad M. & Amanda J. Blake	15.193
S45	Q 05-11-11	Brad M. & Amanda J. Blake	5.0
S46	O 05-11-11.1	Nellie Marie & Robert W. Spencer	5.813
S47	05-11-9	Edwin C. & Kimberly A. Miller	41.773
S48	05-11-9.10	John A. & Janet L. Beucke	2.348
S49	05-11-9.2	Michael R. Bryan	3.143
S50	05-11-9.8	Sean F. Moore	2.070
S51	05-11-9.7	Sean F. Moore	2.026
S52	05-11-9.1	Jack Shepard Huggins Jr., et al	10.92
S53	05-11-9.4	Jack S. Huggins, et al	4.129
S54	05-11-11.2	Wesley R. Bryan & Wesley R. Bryan II	25.031
S55	05-10-16.4	Melvin E. Ferguson & Elizabeth Ferguson	30.87
S56	05-10-15.1	Donald T. Miller	2.095
S57	05-16-3.2	Jimmy Lee Ostrander Jr., Sheena Lynn Ostrander & Brody Ray Ostrander	1.435
S58	05-16-3.1	Dennis E. Jackson, et ux	0.27
S59	05-16-2	Christian Church	0.19
S60	05-16-1	Christian Church	0.50
S61	D 05-16-23.1	Ray E. Minor, et ux	2.0
S62	05-16-23.3	Greg & Christina Riddle	1.0
S63	05-16-24	Alan M. Beyser, et ux	1.083
S64	05-16-23.2	Alan M. Beyser, et ux	1.726
S65	C 05-16-23.4	Michael R. & Brenda K. Bryan	3.0
S66	B 05-16-23	CNX Land Resources, Inc.	60.138
S67	X 05-11-16.2	Joseph Haught	2.181
S68	AA 05-11-16.1	Susan Smith, LE	0.876
S69	CC 05-11-25	Owen Michael Barr	0.598
S70	DD 05-11-23	Owen Michael Barr	0.845
S71	EE 05-11-24	Charles Edward Furbee, et ux	0.603
S72	HH 05-11-17.1	David Gray	0.297
S73	II 05-11-22	David Gray	0.353
S74	JJ 05-11-18	David E. Gray	0.569
S75	KK 05-11-19	David E. Gray	0.532
S76	LL 05-11-20	David E. Gray	0.569
S77	NN 05-11-5.2	Rickey & Victoria Cross	1.0
S78	TT 05-11-1.2	Jay A. Conner, et ux	5.824
S79	UU 05-8-9.1	Scott E. Jackson, Tammy S. South & Marion Jackson	1.957
S80	05-11-1.6	Debra Morris	2.093
S81	05-11-1	William N. & Virginia A. Roupe	4.527
S82	XX 05-11-1.3	Jay A. Conner, et ux	4.256



OPERATOR'S
WELL #: Bryan N-13HU
DISTRICT: Franklin
COUNTY: Marshall
STATE: WV

WELL PLAT
PAGE 2 OF 4
DATE: 12/27/2017
REVISED DATE:
08/01/2019

BRYAN LEASE
UTICA UNIT - 397.0538 AC±
WELL N-13HU
TUG HILL OPERATING

Table with columns: LEASE NO., TAGS, PARCEL, OIL & GAS ROYALTY OWNER, DEED BOOK, PAGE. Lists lease details for various parcels.

Table with columns: LEASE NO., TAGS, PARCEL, OIL & GAS ROYALTY OWNER, DEED BOOK, PAGE. Continuation of lease details from the previous table.



P.S. 708

David L Jackson



OPERATOR'S WELL #: Bryan N-13HU
DISTRICT: Franklin
COUNTY: Marshall
STATE: WV

WELL PLAT PAGE 3 OF 4
DATE: 01/10/2018
REVISED DATE: 08/01/2019

BRYAN LEASE
UTICA UNIT - 397.0538 AC±
WELL N-13HU
TUG HILL OPERATING

Table with columns: LEASE NO., TAGS, PARCEL, OIL & GAS ROYALTY OWNER, DEED BOOK, PAGE. Contains lease details from 10*19192 to 10*19202.

Table with columns: LEASE NO., TAGS, PARCEL, OIL & GAS ROYALTY OWNER, DEED BOOK, PAGE. Contains lease details from 10*19203 to 10*19168.

*** Force pool interest



P.S. 708

Signature of David L. Jackson



TUG HILL OPERATING

OPERATOR'S WELL #: Bryan N-13HU
DISTRICT: Franklin
COUNTY: Marshall
STATE: WV

WELL PLAT PAGE 4 OF 4
DATE: 01/10/2018
REVISED DATE: 08/01/2019



July 31, 2019

Via Electronic Mail Charles.t.brewer@wv.gov

Cc: laura.l.adkins@wv.gov

Taylor Brewer
Assistant Chief - Permitting
WVDEP
Office of Oil & Gas

RE: Permit modifications (47-051-02029 & 47-051-02030)

Mr. Brewer,

Please see attached permit modifications & support information for the above referenced permits. These modifications to the directional drilling plans are submitted with the intent of achieving separation from an area of unstable, over-pressured Marcellus Shale formation. This anomalous section presents multiple downhole issues that threaten the ability to execute the directional plans as they are currently permitted. Please note that the general scope and design of the wells as permitted (as well as the approved units) are not affected and that these changes merely provide vertical section separation from this downhole risk.

Please reach out with any comments or concerns or if additional information is required.

Sincerely,

SEAN GASSER
ENGINEERING MANAGER – D&C
OPERATIONS MANAGER – APPALACHIA
TUG HILL OPERATING
1320 S. UNIVERSITY DRIVE | SUITE 500 | FORT WORTH, TX 76107
817.632.5200 (OFFICE)
817.632.5220 (FAX)
SGASSER@TUG-HILLOP.COM
WWW.TUGHILLOPERATING.COM

1320 S. UNIVERSITY DRIVE • SUITE 500 • FORT WORTH, TX 76107 • T 817.632.5200



Stansberry, Wade A <wade.a.stansberry@wv.gov>

Modification H6A Horizontal Well Work Permit (API: 47-051-02030)

1 message

Stansberry, Wade A <wade.a.stansberry@wv.gov>

Wed, Oct 5, 2022 at 1:28 PM

To: Amy Morris <amorris@tug-hilop.com>, Eric Buzzard <ebuzzard@marshallcountywv.org>

Approval from November 4th, 2019

ATTENTION -- This message contains an attachment. If you are not expecting this message and/or attachment, please exercise extreme caution before opening the file

I have attached a copy of the newly issued well permit number "BRYAN N-13HU" (API 47-051-02030) This will serve as your copy. If you have any questions, then please contact us here at the Office of Oil and Gas.

Thank you,

Wade A. Stansberry

Environmental Resources Specialist 3

West Virginia Department of Environmental Protection

Office of Oil & Gas

601 57th St. SE

Charleston, WV 25304

(304) 926-0499 ext. 1653

(304) 926-0452 fax

Wade.A.Stansberry@wv.gov



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