



west virginia department of environmental protection

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

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

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

TUG HILL OPERATING, LLC
380 SOUTHPOINTE BLVD

CANONSBURG, PA 15317

Re: Permit Modification Approval for BRYAN N-12HU
47-051-02029-00-00

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 handwritten signature in blue ink, appearing to read 'James A. Martin', is written over a faint circular stamp.

James A. Martin
Chief

Operator's Well Number: BRYAN N-12HU
Farm Name: CNX LAND RESOURCES INC.
U.S. WELL NUMBER: 47-051-02029-00-00
Horizontal 6A New Drill
Date Modification Issued: November 4, 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 #47-051-02029

COMPANY: Tug Hill Operating, LLC

FARM: CNX Land Resources, Inc. Bryan N-12HU

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,

A handwritten signature in blue ink that reads "Susan Rose".

Susan Rose
Administrator

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

1) Well Operator: Tug Hill Operating, LLC 494510851 Marshall Franklin Powhatan Point
Operator ID County District Quadrangle

2) Operator's Well Number: Bryan N-12HU 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 11,124' - 11,243' thickness of 119' and anticipated pressure of approx. 9000 psi

8) Proposed Total Vertical Depth: 11,393'

9) Formation at Total Vertical Depth: Trenton

10) Proposed Total Measured Depth: 21,515'

11) Proposed Horizontal Leg Length: 9,820.81'

12) Approximate Fresh Water Strata Depths: 70'; 803'

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 - 701' and Pittsburgh Coal - 796'

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

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

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

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WW-6B
(04/15)

API NO. 47- 051 - 02029 MOD
OPERATOR WELL NO. Bryan N-12HU
Well Pad Name: Bryan

18)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<u>Size (in)</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling (ft)</u>	<u>INTERVALS: Left in Well (ft)</u>	<u>CEMENT: Fill-up (Cu. Ft.)/CTS</u>
Conductor	30"	NEW	BW	BW	100'	100'	216FT^3(CTS)
Fresh Water	20"	NEW	J55	106.5#	903'	903'	1,449ft^3(CTS)
Coal	13 3/8"	NEW	J55	54.5#	2,602'	2,602'	1,837ft^3(CTS)
Intermediate	9 5/8"	NEW	HPP110	47#	10,077'	10,077'	3,285ft^3(CTS)
Production	5 1/2"	NEW	HCP110	23#	21,515'	21,515'	5,100ft^3(CTS)
Tubing	2 7/8"	NEW	P110	6.5#		10,832'	
Liners							

JM 7/31/19

<u>TYPE</u>	<u>Size (in)</u>	<u>Wellbore Diameter (in)</u>	<u>Wall Thickness (in)</u>	<u>Burst Pressure (psi)</u>	<u>Anticipated Max. Internal Pressure (psi)</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
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			RECEIVED Office of Oil and Gas
Sizes:	N/A			AUG - 6 2019
Depths Set:	N/A			WV Department of Environmental Protection

WW-6B
(10/14)

API NO. 47-051 - 02029 MOD
OPERATOR WELL NO. Bryan N-12HU
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 24,557,500 lb proppant and 379,677 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

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25) Proposed borehole conditioning procedures:

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

*Note: Attach additional sheets as needed.

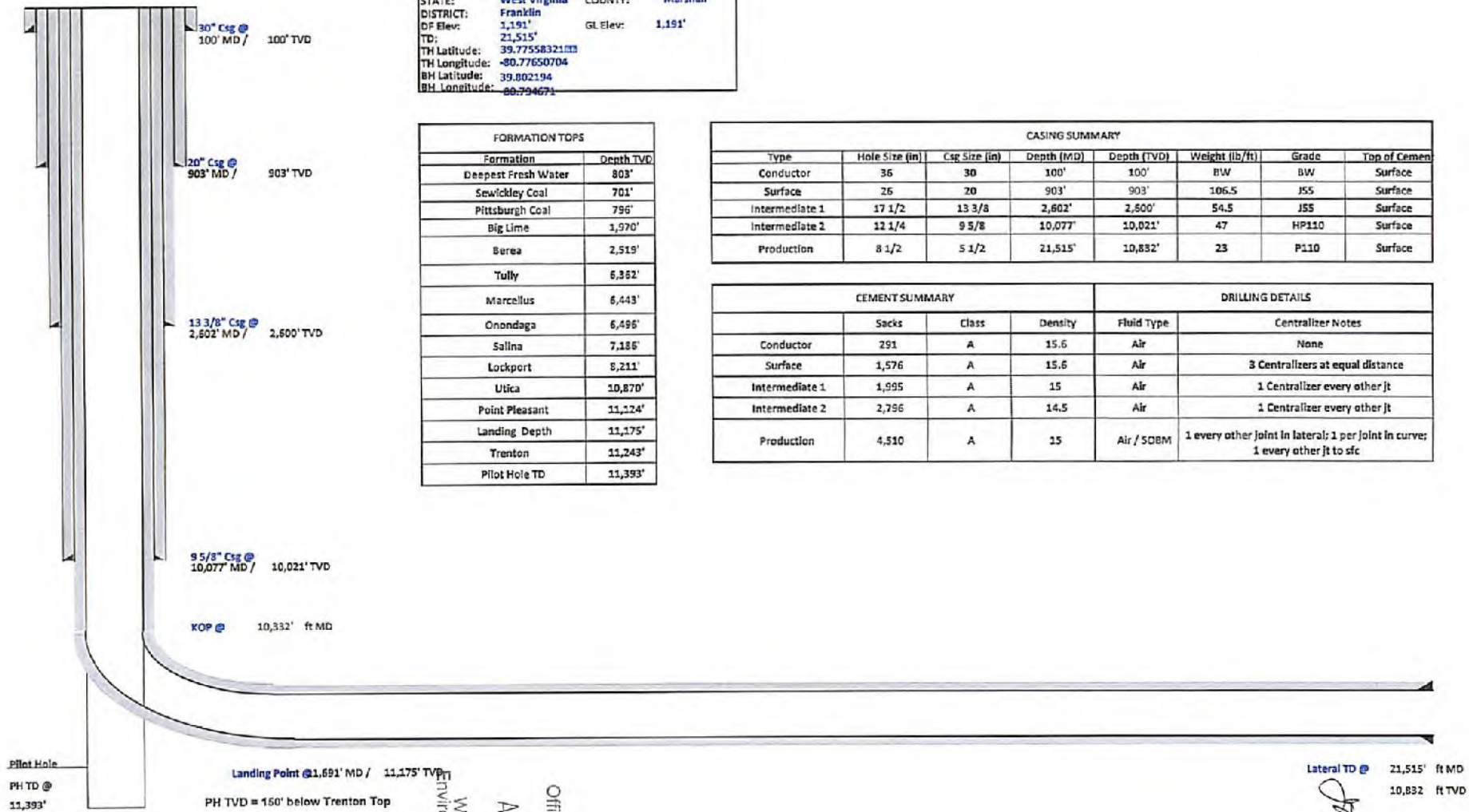


WELL NAME: Bryan N-12HU
STATE: West Virginia **COUNTY:** Marshall
DISTRICT: Franklin
DF Elev: 1,191' **GL Elev:** 1,191'
TD: 21,515'
TH Latitude: 39.77558321133
TH Longitude: -80.77650704
BH Latitude: 39.802194
BH Longitude: -80.794671

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	803'
Sewickley Coal	701'
Pittsburgh Coal	796'
Big Lime	1,970'
Berea	2,519'
Tully	6,382'
Marcellus	6,443'
Onondaga	6,496'
Salina	7,185'
Lockport	8,211'
Utica	10,870'
Point Pleasant	11,124'
Landing Depth	11,175'
Trenton	11,243'
Pilot Hole TD	11,393'

CASING SUMMARY							
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Depth (TVD)	Weight (lb/ft)	Grade	Top of Cemen
Conductor	36	30	100'	100'	BW	BW	Surface
Surface	26	20	903'	903'	106.5	J55	Surface
Intermediate 1	17 1/2	13 3/8	2,802'	2,800'	54.5	J55	Surface
Intermediate 2	12 1/4	9 5/8	10,077'	10,021'	47	HP110	Surface
Production	8 1/2	5 1/2	21,515'	10,832'	23	P110	Surface

	CEMENT SUMMARY			DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	291	A	15.6	Air	None
Surface	1,576	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	1,995	A	15	Air	1 Centralizer every other jt
Intermediate 2	2,796	A	14.5	Air	1 Centralizer every other jt
Production	4,510	A	15	Air / SOBDM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to s/c



Landing Point @ 1,691' MD / 11,175' TVD
 PH TD = 150' below Trenton Top

Lateral TD @ 21,515' ft MD
 10,832' ft TVD

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JFM 7/31/19

47-051-02029 plb



Tug Hill Operating, LLC Casing and Cement Program

Bryan N-12HU

Casing

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	100'	CTS
Surface	20"	J55	26"	903'	CTS
Intermediate 1	13 3/8"	J55	17 1/2"	2,602'	CTS
Intermediate 2	9 5/8"	HP110	12 1/4"	10,077'	CTS
Production	5 1/2"	P110	8 1/2"	21,515'	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

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Tug Hill Operating LLC
Well: Bryan N-12HU (slot F)
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	0.00	0.00	KOP Begin 1°/100' build
2	1100.00	0.00	0.00	1100.00	0.00	0.00	0.00	0.00	0.00	Begin 3.00° tangent
3	1400.00	3.00	170.00	1399.86	-7.73	1.36	1.00	170.000	-7.47	Begin 2°/100' build/turn
4	3102.47	3.00	170.00	3100.00	-95.48	16.84	0.00	0.000	-92.26	Begin 10.00° tangent
5	3691.82	10.00	50.00	3686.53	-77.71	58.86	2.00	-132.592	-95.23	Begin 2°/100' build/turn
6	3841.82	10.00	50.00	3834.26	-60.97	78.81	0.00	0.000	-90.77	Begin 10.68° tangent
7	4184.15	10.58	11.32	4171.42	-10.60	107.85	2.00	-103.648	-59.93	Begin 2°/100' drop
8	6522.25	10.58	11.32	6469.00	414.28	192.93	0.00	0.000	275.80	Begin vertical hold
9	7056.38	0.00	11.32	7000.04	462.96	202.67	2.00	180.000	314.25	Begin 6°/100' build
10	10332.34	0.00	11.32	10276.00	462.96	202.67	0.00	11.321	314.25	Begin 8°/100' build/turn
11	11165.67	50.00	327.70	11007.52	751.29	20.40	6.00	327.700	654.37	Begin 92.00° lateral
12	11691.38	92.00	330.08	11174.89	1168.08	-229.53	8.00	3.558	1139.66	Begin 92.00° lateral
13	21514.83	92.00	330.08	10832.00	9677.50	-5125.68	0.00	0.000	0851.10	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-1181+25 @ 1216.00ust (H&P 611)
 Surface location
 Northing: 14445064.19 Easting: 1703210.52 Latitude: 39.77583321 Longitude: -80.77650704

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

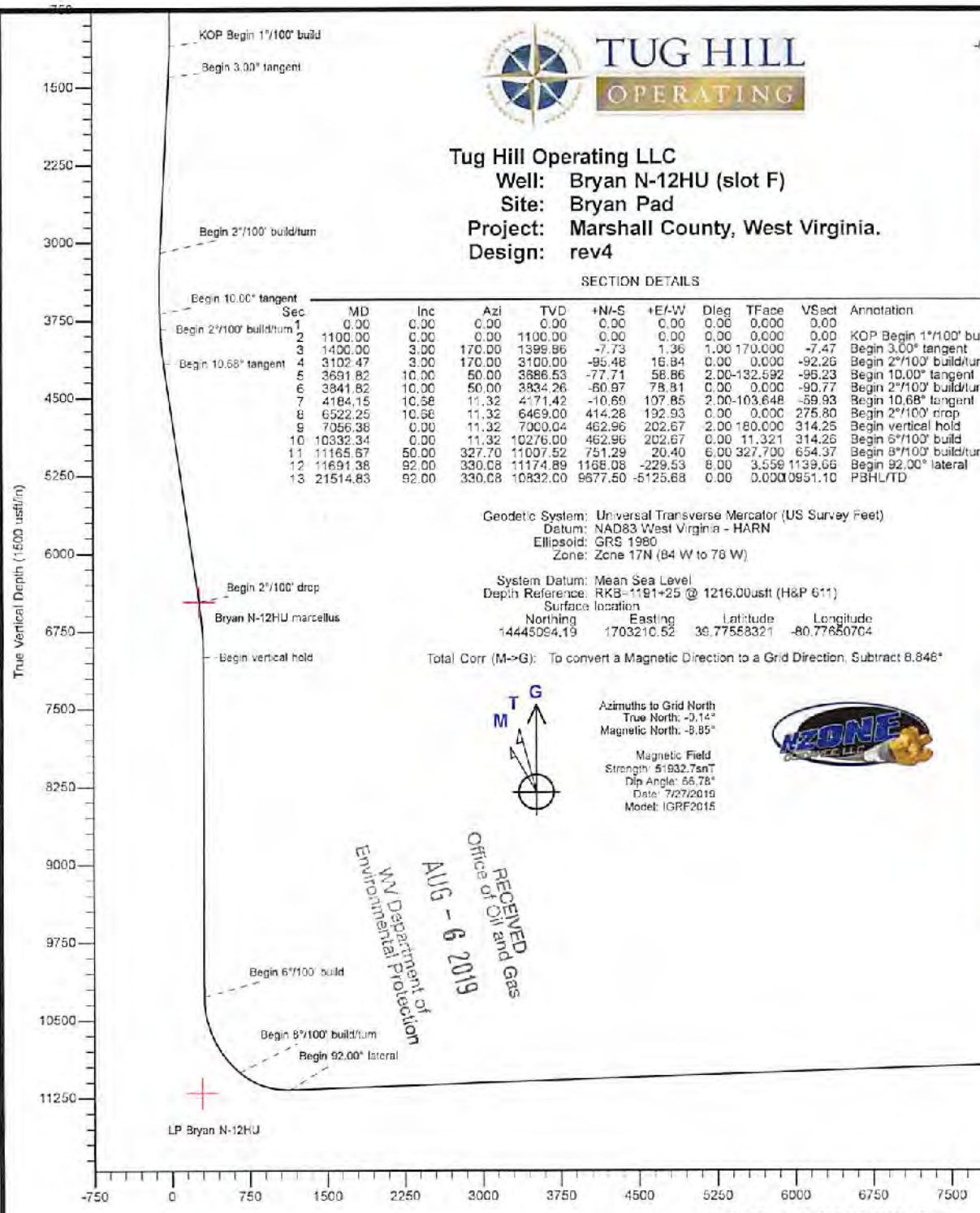
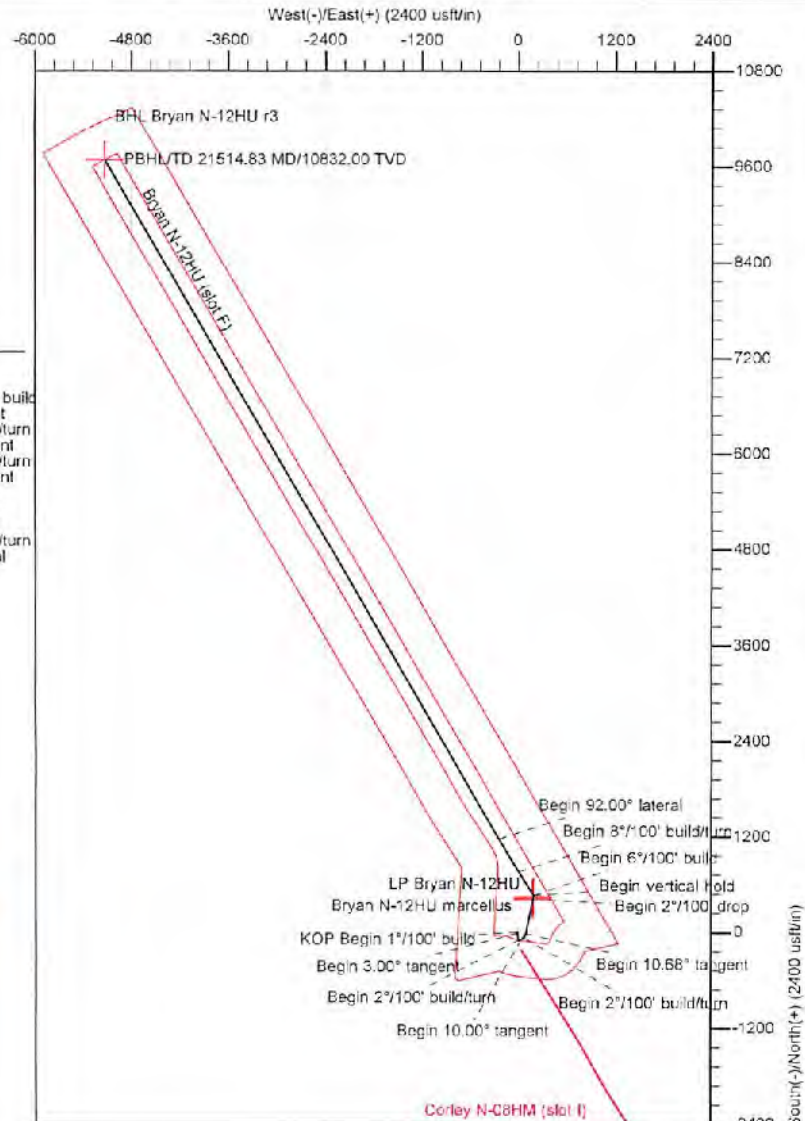


Azimuths to Grid North
 True North: -3.14°
 Magnetic North: -8.95°

Magnetic Field
 Strength: 51932.7nT
 Dip Angle: 55.78°
 Date: 7/27/2019
 Model: IGRF2015



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S1-02029.well



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-12HU (slot F)
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-12HU (slot F)	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-12HU (slot F)					
Well Position	+N/-S	0.00 usft	Northing:	14,445,094.20 usft	Latitude:	39.77558321
	+E/-W	0.00 usft	Easting:	1,703,210.52 usft	Longitude:	-80.77650704
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	51,932.67232791

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	332.09

Plan Survey Tool Program	Date 7/27/2019			
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	21,514.83 rev4 (Original Hole)	MWD	MWD - Standard

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Planning Report - Geographic

51-02029MOD

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-12HU (slot F)
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-12HU (slot F)	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	0.000	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.000	
1,400.00	3.00	170.00	1,399.86	-7.73	1.36	1.00	1.00	0.00	170.000	
3,102.47	3.00	170.00	3,100.00	-95.48	16.84	0.00	0.00	0.00	0.000	
3,691.82	10.00	50.00	3,686.53	-77.71	58.86	2.00	1.19	-20.36	-132.592	
3,841.82	10.00	50.00	3,834.26	-60.97	78.81	0.00	0.00	0.00	0.000	
4,184.15	10.68	11.32	4,171.42	-10.69	107.85	2.00	0.20	-11.30	-103.648	
6,522.25	10.68	11.32	6,469.00	414.28	192.93	0.00	0.00	0.00	0.000	Bryan N-12HU marce
7,056.38	0.00	11.32	7,000.04	462.96	202.67	2.00	-2.00	0.00	180.000	
10,332.34	0.00	11.32	10,276.00	462.96	202.67	0.00	0.00	0.00	11.321	
11,165.67	50.00	327.70	11,007.52	751.29	20.40	6.00	6.00	0.00	327.700	
11,891.38	92.00	330.08	11,174.89	1,168.08	-229.53	8.00	7.99	0.45	3.559	
21,514.83	92.00	330.08	10,832.00	9,677.50	-5,125.68	0.00	0.00	0.00	0.000	BHL Bryan N-12HU r

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Planning Report - Geographic

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Project:	Marshall County, West Virginia.	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	North Reference:	Grid
Well:	Bryan N-12HU (slot F)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

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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	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
100.00	0.00	0.00	100.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
200.00	0.00	0.00	200.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
300.00	0.00	0.00	300.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
400.00	0.00	0.00	400.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
500.00	0.00	0.00	500.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
600.00	0.00	0.00	600.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
700.00	0.00	0.00	700.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
800.00	0.00	0.00	800.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
900.00	0.00	0.00	900.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,445,094.20	1,703,210.52	39.77558321	-80.77650704
KOP Begin 1°/100' build									
1,200.00	1.00	170.00	1,199.99	-0.86	0.15	14,445,093.34	1,703,210.67	39.77558085	-80.77650851
1,300.00	2.00	170.00	1,299.96	-3.44	0.61	14,445,090.76	1,703,211.13	39.77557377	-80.77650491
1,400.00	3.00	170.00	1,399.86	-7.73	1.36	14,445,086.46	1,703,211.89	39.77556197	-80.77650226
Begin 3.00° tangent									
1,500.00	3.00	170.00	1,499.73	-12.89	2.27	14,445,081.31	1,703,212.79	39.77554780	-80.77649907
1,600.00	3.00	170.00	1,599.59	-18.04	3.18	14,445,076.16	1,703,213.70	39.77553364	-80.77649588
1,700.00	3.00	170.00	1,699.45	-23.20	4.09	14,445,071.00	1,703,214.61	39.77551948	-80.77649269
1,800.00	3.00	170.00	1,799.31	-28.35	5.00	14,445,065.85	1,703,215.52	39.77550532	-80.77648950
1,900.00	3.00	170.00	1,899.18	-33.50	5.91	14,445,060.69	1,703,216.43	39.77549116	-80.77648631
2,000.00	3.00	170.00	1,999.04	-38.66	6.82	14,445,055.54	1,703,217.34	39.77547700	-80.77648312
2,100.00	3.00	170.00	2,098.90	-43.81	7.73	14,445,050.38	1,703,218.25	39.77546284	-80.77647994
2,200.00	3.00	170.00	2,198.77	-48.97	8.63	14,445,045.23	1,703,219.16	39.77544868	-80.77647675
2,300.00	3.00	170.00	2,298.63	-54.12	9.54	14,445,040.08	1,703,220.06	39.77543452	-80.77647356
2,400.00	3.00	170.00	2,398.49	-59.27	10.45	14,445,034.92	1,703,220.97	39.77542036	-80.77647037
2,500.00	3.00	170.00	2,498.36	-64.43	11.36	14,445,029.77	1,703,221.88	39.77540620	-80.77646718
2,600.00	3.00	170.00	2,598.22	-69.58	12.27	14,445,024.61	1,703,222.79	39.77539204	-80.77646399
2,700.00	3.00	170.00	2,698.08	-74.74	13.18	14,445,019.46	1,703,223.70	39.77537788	-80.77646080
2,800.00	3.00	170.00	2,797.94	-79.89	14.09	14,445,014.31	1,703,224.61	39.77536371	-80.77645761
2,900.00	3.00	170.00	2,897.81	-85.04	15.00	14,445,009.15	1,703,225.52	39.77534955	-80.77645443
3,000.00	3.00	170.00	2,997.67	-90.20	15.90	14,445,004.00	1,703,226.43	39.77533539	-80.77645124
3,100.00	3.00	170.00	3,097.53	-95.35	16.81	14,444,998.84	1,703,227.34	39.77532123	-80.77644805
3,102.47	3.00	170.00	3,100.00	-95.48	16.84	14,444,998.72	1,703,227.36	39.77532088	-80.77644797
Begin 2°/100' build/turn									
3,200.00	2.21	129.46	3,197.44	-99.19	18.73	14,444,995.01	1,703,229.25	39.77531068	-80.77644126
3,300.00	2.93	86.35	3,297.34	-100.25	22.77	14,444,993.94	1,703,233.29	39.77530774	-80.77642691
3,400.00	4.50	66.72	3,397.13	-98.54	28.91	14,444,995.66	1,703,239.44	39.77531240	-80.77640501
3,500.00	6.32	57.75	3,496.69	-94.05	37.17	14,445,000.14	1,703,247.69	39.77532466	-80.77637558
3,600.00	8.22	52.85	3,595.88	-86.80	47.52	14,445,007.39	1,703,258.04	39.77534450	-80.77633868
3,691.82	10.00	50.00	3,686.53	-77.71	58.86	14,445,016.48	1,703,269.38	39.77536938	-80.77629824
Begin 10.00° tangent									
3,700.00	10.00	50.00	3,694.59	-76.80	59.95	14,445,017.40	1,703,270.47	39.77537189	-80.77629436
3,800.00	10.00	50.00	3,793.08	-65.64	73.25	14,445,028.56	1,703,283.77	39.77540245	-80.77624692
3,841.82	10.00	50.00	3,834.26	-60.97	78.81	14,445,033.23	1,703,289.34	39.77541523	-80.77622708
Begin 2°/100' build/turn									
3,900.00	9.79	43.34	3,891.58	-54.13	86.06	14,445,040.07	1,703,296.60	39.77543398	-80.77620116
4,000.00	9.75	31.53	3,990.14	-40.73	96.34	14,445,053.47	1,703,306.86	39.77547071	-80.77616452
4,100.00	10.10	20.09	4,088.65	-25.27	103.78	14,445,068.92	1,703,314.30	39.77551309	-80.77613790
4,184.15	10.83	11.32	4,171.42	-10.69	107.85	14,445,083.50	1,703,318.37	39.77555310	-80.77612330
Begin 10.88° tangent									
4,200.00	10.83	11.32	4,187.00	-7.81	108.42	14,445,086.38	1,703,318.94	39.77556101	-80.77612122
4,300.00	10.83	11.32	4,285.27	10.36	112.06	14,445,104.56	1,703,322.58	39.77561090	-80.77610811

SI-02029 mod



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-12HU (slot F)
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-12HU (slot F)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

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Planned Survey										WV Department of Environmental Protection
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
4,400.00	10.68	11.32	4,383.53	28.54	115.70	14,445,122.74	1,703,326.22	39.77566079	-80.77609500	
4,500.00	10.68	11.32	4,481.80	46.72	119.34	14,445,140.91	1,703,329.86	39.77571069	-80.77608188	
4,600.00	10.68	11.32	4,580.07	64.89	122.96	14,445,159.09	1,703,333.50	39.77576058	-80.77606877	
4,700.00	10.68	11.32	4,678.33	83.07	126.62	14,445,177.26	1,703,337.14	39.77581047	-80.77605566	
4,800.00	10.68	11.32	4,776.60	101.24	130.26	14,445,195.44	1,703,340.78	39.77586036	-80.77604254	
4,900.00	10.68	11.32	4,874.87	119.42	133.89	14,445,213.62	1,703,344.42	39.77591025	-80.77602943	
5,000.00	10.68	11.32	4,973.14	137.60	137.53	14,445,231.79	1,703,348.06	39.77596014	-80.77601632	
5,100.00	10.68	11.32	5,071.40	155.77	141.17	14,445,249.97	1,703,351.69	39.77601004	-80.77600320	
5,200.00	10.68	11.32	5,169.67	173.95	144.81	14,445,268.14	1,703,355.33	39.77605993	-80.77599009	
5,300.00	10.68	11.32	5,267.94	192.12	148.45	14,445,286.32	1,703,358.97	39.77610982	-80.77597698	
5,400.00	10.68	11.32	5,366.20	210.30	152.09	14,445,304.50	1,703,362.61	39.77615971	-80.77596387	
5,500.00	10.68	11.32	5,464.47	228.48	155.73	14,445,322.67	1,703,366.25	39.77620960	-80.77595075	
5,600.00	10.68	11.32	5,562.74	246.65	159.37	14,445,340.85	1,703,369.89	39.77625949	-80.77593764	
5,700.00	10.68	11.32	5,661.00	264.83	163.01	14,445,359.02	1,703,373.53	39.77630939	-80.77592453	
5,800.00	10.68	11.32	5,759.27	283.00	166.64	14,445,377.20	1,703,377.17	39.77635928	-80.77591141	
5,900.00	10.68	11.32	5,857.54	301.18	170.28	14,445,395.38	1,703,380.81	39.77640917	-80.77589830	
6,000.00	10.68	11.32	5,955.80	319.36	173.92	14,445,413.55	1,703,384.44	39.77645906	-80.77588519	
6,100.00	10.68	11.32	6,054.07	337.53	177.56	14,445,431.73	1,703,388.08	39.77650895	-80.77587207	
6,200.00	10.68	11.32	6,152.34	355.71	181.20	14,445,449.91	1,703,391.72	39.77655884	-80.77585896	
6,300.00	10.68	11.32	6,250.61	373.89	184.84	14,445,468.08	1,703,395.36	39.77660874	-80.77584585	
6,400.00	10.68	11.32	6,348.87	392.06	188.48	14,445,486.26	1,703,399.00	39.77665863	-80.77583273	
6,500.00	10.68	11.32	6,447.14	410.24	192.12	14,445,504.43	1,703,402.64	39.77670852	-80.77581962	
6,522.25	10.68	11.32	6,469.00	414.28	192.93	14,445,508.48	1,703,403.45	39.77671962	-80.77581670	
Begin 2"/100' drop										
6,600.00	9.13	11.32	6,545.59	427.40	195.55	14,445,521.59	1,703,406.07	39.77675562	-80.77580724	
6,700.00	7.13	11.32	6,644.58	441.26	198.33	14,445,535.45	1,703,408.85	39.77679366	-80.77579724	
6,800.00	5.13	11.32	6,744.01	451.72	200.42	14,445,545.92	1,703,410.94	39.77682239	-80.77578969	
6,900.00	3.13	11.32	6,843.74	458.78	201.83	14,445,552.98	1,703,412.36	39.77684176	-80.77578460	
7,000.00	1.13	11.32	6,943.67	462.42	202.56	14,445,556.62	1,703,413.09	39.77685176	-80.77578197	
7,056.38	0.00	11.32	7,000.04	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
Begin vertical hold										
7,100.00	0.00	0.00	7,043.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
7,200.00	0.00	11.32	7,143.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
7,300.00	0.00	11.32	7,243.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
7,400.00	0.00	11.32	7,343.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
7,500.00	0.00	11.32	7,443.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
7,600.00	0.00	11.32	7,543.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
7,700.00	0.00	11.32	7,643.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
7,800.00	0.00	11.32	7,743.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
7,900.00	0.00	11.32	7,843.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
8,000.00	0.00	11.32	7,943.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
8,100.00	0.00	0.00	8,043.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
8,200.00	0.00	11.32	8,143.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
8,300.00	0.00	11.32	8,243.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
8,400.00	0.00	11.32	8,343.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
8,500.00	0.00	11.32	8,443.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
8,600.00	0.00	11.32	8,543.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
8,700.00	0.00	0.00	8,643.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
8,800.00	0.00	11.32	8,743.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
8,900.00	0.00	11.32	8,843.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
9,000.00	0.00	11.32	8,943.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
9,100.00	0.00	11.32	9,043.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
9,200.00	0.00	0.00	9,143.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	
9,300.00	0.00	11.32	9,243.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158	



Planning Report - Geographic

SI-02029M09

Database:	DB_Jul2216ct_v14	Local Co-ordinate Reference:	Well Bryan N-12HU (slot F)
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-12HU (slot F)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

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Planned Survey

WV Department of Environmental Protection

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,400.00	0.00	11.32	9,343.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
9,500.00	0.00	11.32	9,443.66	482.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
9,600.00	0.00	11.32	9,543.66	482.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
9,700.00	0.00	11.32	9,643.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
9,800.00	0.00	0.00	9,743.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
9,900.00	0.00	11.32	9,843.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
10,000.00	0.00	11.32	9,943.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
10,100.00	0.00	11.32	10,043.66	482.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
10,200.00	0.00	11.32	10,143.66	482.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
10,300.00	0.00	11.32	10,243.66	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
10,332.34	0.00	11.32	10,276.00	462.96	202.67	14,445,557.16	1,703,413.19	39.77685325	-80.77578158
Begin 6"/100' build									
10,400.00	4.06	327.70	10,343.61	464.99	201.39	14,445,559.19	1,703,411.91	39.77685882	-80.77578612
10,500.00	10.06	327.70	10,442.80	475.37	194.83	14,445,569.57	1,703,405.35	39.77688738	-80.77580939
10,600.00	16.06	327.70	10,540.17	494.47	182.76	14,445,568.66	1,703,393.28	39.77693990	-80.77585218
10,700.00	22.06	327.70	10,634.65	522.05	165.32	14,445,616.25	1,703,375.84	39.77701579	-80.77591401
10,800.00	28.06	327.70	10,725.19	557.84	142.69	14,445,652.04	1,703,353.22	39.77711422	-80.77599421
10,900.00	34.06	327.70	10,810.82	601.43	115.14	14,445,695.63	1,703,325.86	39.77723412	-80.77609190
11,000.00	40.06	327.70	10,890.58	652.35	82.95	14,445,746.54	1,703,293.47	39.77737417	-80.77620601
11,100.00	46.06	327.70	10,963.61	710.03	46.48	14,445,804.23	1,703,257.00	39.77753284	-80.77633529
11,165.67	50.00	327.70	11,007.52	751.29	20.40	14,445,845.49	1,703,230.92	39.77764633	-80.77642777
Begin 8"/100' build/turn									
11,200.00	52.74	327.91	11,028.95	773.99	6.11	14,445,868.18	1,703,216.63	39.77770876	-80.77647841
11,300.00	60.73	328.46	11,083.76	844.99	-37.91	14,445,939.19	1,703,172.61	39.77790406	-80.77663448
11,400.00	68.72	328.93	11,126.42	922.20	-84.85	14,446,016.39	1,703,125.67	39.77811640	-80.77680086
11,500.00	76.71	329.35	11,156.11	1,004.09	-133.79	14,446,098.29	1,703,076.73	39.77834185	-80.77697431
11,600.00	84.70	329.74	11,172.26	1,089.09	-183.77	14,446,183.29	1,703,026.75	39.77857542	-80.77715146
11,691.38	92.00	330.08	11,174.89	1,168.08	-229.53	14,446,262.27	1,702,980.99	39.77879264	-80.77731365
Begin 92.00° lateral									
11,700.00	92.00	330.08	11,174.59	1,175.54	-233.83	14,446,269.74	1,702,976.69	39.77881317	-80.77732887
11,800.00	92.00	330.08	11,171.10	1,262.16	-283.67	14,446,356.36	1,702,926.85	39.77905141	-80.77750550
11,900.00	92.00	330.08	11,167.61	1,348.79	-333.51	14,446,442.98	1,702,877.01	39.77928964	-80.77768214
12,000.00	92.00	330.08	11,164.12	1,435.41	-383.35	14,446,529.61	1,702,827.17	39.77952787	-80.77785878
12,100.00	92.00	330.08	11,160.63	1,522.03	-433.20	14,446,616.23	1,702,777.33	39.77976610	-80.77803541
12,200.00	92.00	330.08	11,157.13	1,608.66	-483.04	14,446,702.85	1,702,727.48	39.78000433	-80.77821205
12,300.00	92.00	330.08	11,153.64	1,695.28	-532.88	14,446,789.48	1,702,677.64	39.78024257	-80.77838869
12,400.00	92.00	330.08	11,150.15	1,781.91	-582.72	14,446,876.10	1,702,627.80	39.78048080	-80.77856533
12,500.00	92.00	330.08	11,146.66	1,868.53	-632.56	14,446,962.73	1,702,577.96	39.78071903	-80.77874198
12,600.00	92.00	330.08	11,143.17	1,955.15	-682.40	14,447,049.35	1,702,528.12	39.78095726	-80.77891862
12,700.00	92.00	330.08	11,139.68	2,041.78	-732.24	14,447,135.97	1,702,478.28	39.78119549	-80.77909526
12,800.00	92.00	330.08	11,136.19	2,128.40	-782.09	14,447,222.60	1,702,428.44	39.78143372	-80.77927191
12,900.00	92.00	330.08	11,132.70	2,215.02	-831.93	14,447,309.22	1,702,378.60	39.78167195	-80.77944856
13,000.00	92.00	330.08	11,129.21	2,301.65	-881.77	14,447,395.84	1,702,328.75	39.78191018	-80.77962521
13,100.00	92.00	330.08	11,125.72	2,388.27	-931.61	14,447,482.47	1,702,278.91	39.78214841	-80.77980186
13,200.00	92.00	330.08	11,122.23	2,474.89	-981.45	14,447,569.09	1,702,229.07	39.78238664	-80.77997851
13,300.00	92.00	330.08	11,118.74	2,561.52	-1,031.29	14,447,655.71	1,702,179.23	39.78262486	-80.78015516
13,400.00	92.00	330.08	11,115.25	2,648.14	-1,081.13	14,447,742.34	1,702,129.39	39.78286309	-80.78033181
13,500.00	92.00	330.08	11,111.76	2,734.77	-1,130.98	14,447,828.96	1,702,079.55	39.78310132	-80.78050847
13,600.00	92.00	330.08	11,108.27	2,821.39	-1,180.82	14,447,915.59	1,702,029.71	39.78333955	-80.78068512
13,700.00	92.00	330.08	11,104.78	2,908.01	-1,230.66	14,448,002.21	1,701,979.86	39.78357778	-80.78086178
13,800.00	92.00	330.08	11,101.29	2,994.64	-1,280.50	14,448,088.83	1,701,930.02	39.78381600	-80.78103844
13,900.00	92.00	330.08	11,097.80	3,081.26	-1,330.34	14,448,175.46	1,701,880.18	39.78405423	-80.78121510
14,000.00	92.00	330.08	11,094.31	3,167.88	-1,380.18	14,448,262.08	1,701,830.34	39.78429246	-80.78139176
14,100.00	92.00	330.08	11,090.82	3,254.51	-1,430.02	14,448,348.70	1,701,780.50	39.78453068	-80.78156842



Planning Report - Geographic

51-02029 MON

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-12HU (slot F)
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-12HU (slot F)	Survey Calculation Method:	Minimum Curvature
Wallbora:	Original Hole		
Design:	rev4		

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Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	WV Department of Environmental Protection
14,200.00	92.00	330.08	11,087.32	3,341.13	-1,479.86	14,448,435.33	1,701,730.66	39.78476691	-80.78174509
14,300.00	92.00	330.08	11,083.83	3,427.75	-1,529.71	14,448,521.95	1,701,680.82	39.78500714	-80.78192175
14,400.00	92.00	330.08	11,080.34	3,514.38	-1,579.55	14,448,608.57	1,701,630.97	39.78524536	-80.78209842
14,500.00	92.00	330.08	11,076.85	3,601.00	-1,629.39	14,448,695.20	1,701,581.13	39.78548359	-80.78227508
14,600.00	92.00	330.08	11,073.36	3,687.63	-1,679.23	14,448,781.82	1,701,531.29	39.78572181	-80.78245175
14,700.00	92.00	330.08	11,069.87	3,774.25	-1,729.07	14,448,868.45	1,701,481.45	39.78596004	-80.78262842
14,800.00	92.00	330.08	11,066.38	3,860.87	-1,778.91	14,448,955.07	1,701,431.61	39.78619826	-80.78280509
14,900.00	92.00	330.08	11,062.89	3,947.50	-1,828.75	14,449,041.69	1,701,381.77	39.78643648	-80.78298176
15,000.00	92.00	330.08	11,059.40	4,034.12	-1,878.60	14,449,128.32	1,701,331.93	39.78667471	-80.78315844
15,100.00	92.00	330.08	11,055.91	4,120.74	-1,928.44	14,449,214.94	1,701,282.09	39.78691293	-80.78333511
15,200.00	92.00	330.08	11,052.42	4,207.37	-1,978.28	14,449,301.56	1,701,232.24	39.78715116	-80.78351179
15,300.00	92.00	330.08	11,048.93	4,293.99	-2,028.12	14,449,388.19	1,701,182.40	39.78738938	-80.78368846
15,400.00	92.00	330.08	11,045.44	4,380.61	-2,077.96	14,449,474.81	1,701,132.56	39.78762750	-80.78386514
15,500.00	92.00	330.08	11,041.95	4,467.24	-2,127.80	14,449,561.43	1,701,082.72	39.78786582	-80.78404182
15,600.00	92.00	330.08	11,038.46	4,553.86	-2,177.64	14,449,648.06	1,701,032.88	39.78810405	-80.78421850
15,700.00	92.00	330.08	11,034.97	4,640.49	-2,227.49	14,449,734.68	1,700,983.04	39.78834227	-80.78439518
15,800.00	92.00	330.08	11,031.48	4,727.11	-2,277.33	14,449,821.31	1,700,933.20	39.78858049	-80.78457186
15,900.00	92.00	330.08	11,027.99	4,813.73	-2,327.17	14,449,907.93	1,700,883.35	39.78881871	-80.78474855
16,000.00	92.00	330.08	11,024.50	4,900.36	-2,377.01	14,449,994.55	1,700,833.51	39.78905693	-80.78492523
16,100.00	92.00	330.08	11,021.01	4,986.98	-2,426.85	14,450,081.18	1,700,783.67	39.78929515	-80.78510192
16,200.00	92.00	330.08	11,017.51	5,073.60	-2,476.69	14,450,167.80	1,700,733.83	39.78953337	-80.78527861
16,300.00	92.00	330.08	11,014.02	5,160.23	-2,526.53	14,450,254.42	1,700,683.99	39.78977160	-80.78545529
16,400.00	92.00	330.08	11,010.53	5,246.85	-2,576.37	14,450,341.05	1,700,634.15	39.79000982	-80.78563198
16,500.00	92.00	330.08	11,007.04	5,333.47	-2,626.22	14,450,427.67	1,700,584.31	39.79024804	-80.78580866
16,600.00	92.00	330.08	11,003.55	5,420.10	-2,676.06	14,450,514.29	1,700,534.48	39.79048625	-80.78598537
16,700.00	92.00	330.08	11,000.06	5,506.72	-2,725.90	14,450,600.92	1,700,484.62	39.79072447	-80.78616206
16,800.00	92.00	330.08	10,996.57	5,593.35	-2,775.74	14,450,687.54	1,700,434.78	39.79096269	-80.78633876
16,900.00	92.00	330.08	10,993.08	5,679.97	-2,825.58	14,450,774.17	1,700,384.94	39.79120091	-80.78651545
17,000.00	92.00	330.08	10,989.59	5,766.59	-2,875.42	14,450,860.79	1,700,335.10	39.79143913	-80.78669215
17,100.00	92.00	330.08	10,986.10	5,853.22	-2,925.26	14,450,947.41	1,700,285.26	39.79167735	-80.78686885
17,200.00	92.00	330.08	10,982.61	5,939.84	-2,975.11	14,451,034.04	1,700,235.42	39.79191557	-80.78704555
17,300.00	92.00	330.08	10,979.12	6,026.46	-3,024.95	14,451,120.66	1,700,185.57	39.79215379	-80.78722225
17,400.00	92.00	330.08	10,975.63	6,113.09	-3,074.79	14,451,207.28	1,700,135.73	39.79239200	-80.78739895
17,500.00	92.00	330.08	10,972.14	6,199.71	-3,124.63	14,451,293.91	1,700,085.89	39.79263022	-80.78757566
17,600.00	92.00	330.08	10,968.65	6,286.33	-3,174.47	14,451,380.53	1,700,036.05	39.79286844	-80.78775236
17,700.00	92.00	330.08	10,965.16	6,372.96	-3,224.31	14,451,467.15	1,699,986.21	39.79310665	-80.78792907
17,800.00	92.00	330.08	10,961.67	6,459.58	-3,274.15	14,451,553.78	1,699,936.37	39.79334487	-80.78810577
17,900.00	92.00	330.08	10,958.18	6,546.21	-3,324.00	14,451,640.40	1,699,886.53	39.79358308	-80.78828248
18,000.00	92.00	330.08	10,954.69	6,632.83	-3,373.84	14,451,727.03	1,699,836.69	39.79382130	-80.78845919
18,100.00	92.00	330.08	10,951.20	6,719.45	-3,423.68	14,451,813.65	1,699,786.84	39.79405952	-80.78863590
18,200.00	92.00	330.08	10,947.70	6,806.08	-3,473.52	14,451,900.27	1,699,737.00	39.79429773	-80.78881261
18,300.00	92.00	330.08	10,944.21	6,892.70	-3,523.36	14,451,986.90	1,699,687.16	39.79453595	-80.78898933
18,400.00	92.00	330.08	10,940.72	6,979.32	-3,573.20	14,452,073.52	1,699,637.32	39.79477416	-80.78916604
18,500.00	92.00	330.08	10,937.23	7,065.95	-3,623.04	14,452,160.14	1,699,587.48	39.79501237	-80.78934276
18,600.00	92.00	330.08	10,933.74	7,152.57	-3,672.89	14,452,246.77	1,699,537.64	39.79525059	-80.78951947
18,700.00	92.00	330.08	10,930.25	7,239.19	-3,722.73	14,452,333.39	1,699,487.80	39.79548880	-80.78969619
18,800.00	92.00	330.08	10,926.76	7,325.82	-3,772.57	14,452,420.01	1,699,437.95	39.79572702	-80.78987291
18,900.00	92.00	330.08	10,923.27	7,412.44	-3,822.41	14,452,506.64	1,699,388.11	39.79596523	-80.79004963
19,000.00	92.00	330.08	10,919.78	7,499.07	-3,872.25	14,452,593.26	1,699,338.27	39.79620344	-80.79022635
19,100.00	92.00	330.08	10,916.29	7,585.69	-3,922.09	14,452,679.89	1,699,288.43	39.79644165	-80.79040307
19,200.00	92.00	330.08	10,912.80	7,672.31	-3,971.93	14,452,766.51	1,699,238.59	39.79667987	-80.79057980
19,300.00	92.00	330.08	10,909.31	7,758.94	-4,021.77	14,452,853.13	1,699,188.75	39.79691808	-80.79075652
19,400.00	92.00	330.08	10,905.82	7,845.56	-4,071.62	14,452,939.76	1,699,138.91	39.79715629	-80.79093325
19,500.00	92.00	330.08	10,902.33	7,932.18	-4,121.46	14,453,026.38	1,699,089.08	39.79739450	-80.79110998
19,600.00	92.00	330.08	10,898.84	8,018.81	-4,171.30	14,453,113.00	1,699,039.22	39.79763271	-80.79128671



Planning Report - Geographic

51-0202-91407

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-12HU (slot F)
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-12HU (slot F)	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
19,700.00	92.00	330.08	10,895.35	8,105.43	-4,221.14	14,453,199.63	1,698,989.38	39.79787092	-80.79146344
19,800.00	92.00	330.08	10,891.86	8,192.05	-4,270.98	14,453,286.25	1,698,939.54	39.79810913	-80.79184017
19,900.00	92.00	330.08	10,888.37	8,278.68	-4,320.82	14,453,372.87	1,698,889.70	39.79834735	-80.79181690
20,000.00	92.00	330.08	10,884.88	8,365.30	-4,370.66	14,453,459.50	1,698,839.86	39.79858556	-80.79199364
20,100.00	92.00	330.08	10,881.38	8,451.93	-4,420.51	14,453,546.12	1,698,790.02	39.79882377	-80.79217037
20,200.00	92.00	330.08	10,877.89	8,538.55	-4,470.35	14,453,632.75	1,698,740.17	39.79906198	-80.79234711
20,300.00	92.00	330.08	10,874.40	8,625.17	-4,520.19	14,453,719.37	1,698,690.33	39.79930018	-80.79252384
20,400.00	92.00	330.08	10,870.91	8,711.80	-4,570.03	14,453,805.99	1,698,640.49	39.79953839	-80.79270058
20,500.00	92.00	330.08	10,867.42	8,798.42	-4,619.87	14,453,892.62	1,698,590.65	39.79977660	-80.79287732
20,600.00	92.00	330.08	10,863.93	8,885.04	-4,669.71	14,453,979.24	1,698,540.81	39.80001481	-80.79305405
20,700.00	92.00	330.08	10,860.44	8,971.67	-4,719.55	14,454,065.86	1,698,490.97	39.80025302	-80.79323081
20,800.00	92.00	330.08	10,856.95	9,058.29	-4,769.40	14,454,152.49	1,698,441.13	39.80049123	-80.79340755
20,900.00	92.00	330.08	10,853.46	9,144.91	-4,819.24	14,454,239.11	1,698,391.29	39.80072943	-80.79358429
21,000.00	92.00	330.08	10,849.97	9,231.54	-4,869.08	14,454,325.73	1,698,341.44	39.80096764	-80.79376104
21,100.00	92.00	330.08	10,846.48	9,318.16	-4,918.92	14,454,412.36	1,698,291.60	39.80120585	-80.79393779
21,200.00	92.00	330.08	10,842.99	9,404.79	-4,968.76	14,454,498.98	1,698,241.76	39.80144406	-80.79411454
21,300.00	92.00	330.08	10,839.50	9,491.41	-5,018.60	14,454,585.61	1,698,191.92	39.80168226	-80.79429129
21,400.00	92.00	330.08	10,836.01	9,578.03	-5,068.44	14,454,672.23	1,698,142.08	39.80192047	-80.79446804
21,500.00	92.00	330.08	10,832.52	9,664.66	-5,118.29	14,454,758.85	1,698,092.24	39.80215868	-80.79464479
21,514.83	92.00	330.08	10,832.00	9,677.50	-5,125.68	14,454,771.70	1,698,084.85	39.80219400	-80.79467100

PBHL/TD 21514.83 MD/10832.00 TVD

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Bryan N-12HU marcellus - hit/miss target - Shape - Point	0.00	0.01	8,469.00	414.28	192.93	14,445,508.48	1,703,403.45	39.77671962	-80.77581670
BHL Bryan N-12HU r3 - plan hits target center - Point	0.00	0.00	10,832.00	9,677.50	-5,125.68	14,454,771.70	1,698,084.85	39.80219400	-80.79467100
LP Bryan N-12HU - plan misses target center by 391.35usft at 11062.25usft MD (10936.89 TVD, 687.50 N, 60.73 E) - Point	0.00	0.01	11,204.00	440.65	205.21	14,445,534.85	1,703,415.73	39.77679195	-80.77577276

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Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Bryan N-12HU (slot F)
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-12HU (slot F)	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
1,400.00	1,399.66	-7.73	1.36	Begin 3.00° tangent
3,102.47	3,100.00	-95.48	16.84	Begin 2°/100' build/turn
3,691.82	3,686.53	-77.71	56.86	Begin 10.00° tangent
3,841.82	3,834.26	-60.97	78.81	Begin 2°/100' build/turn
4,184.15	4,171.42	-10.69	107.85	Begin 10.68° tangent
6,522.25	6,469.00	414.28	192.93	Begin 2°/100' drop
7,056.38	7,000.04	462.96	202.67	Begin vertical hold
10,332.34	10,276.00	462.96	202.67	Begin 6°/100' build
11,165.67	11,007.52	751.29	20.40	Begin 8°/100' build/turn
11,691.38	11,174.89	1,168.08	-229.53	Begin 92.00° lateral
21,514.83	10,832.00	9,677.50	-5,125.68	PBHL/TD 21514.83 MD/10832.00 TVD

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

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

Data Sources Reviewed:

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

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

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WV Geological & Economic Survey Well: County = 51 Permit = 70808

Location Information [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_N	QUAD_14	LAT_DD	LONG_DD	UTM_N	UTM_E
5124170808	Wayne	70808	Franklin	Reynolds East	0400000	39.734971	-81.618412	4502060.2	

There is no Bottom Hole Location data for this well

Owner Information

API	CMP_ID	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE_NUM	MINERAL_OWN	OPERATOR_A1	COMPLETION	PROP_VD	PROP_TRTL_PN	TFR_EST_PN
5124170808	000		Active	Billy Mae John Wilson	1		1497		Manfredschmidt & Sons Co				

Completion Information

API	CMP_ID	SPUD_DT	ELEV	DARUM	FIELD	DEEPEST_FM	DEEPEST_PMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVS	TMD	NEW_FTS	KOO	G_BEF	G_AFT	
5124170808	000							UNCLASS	UNCLASS		NO. 2 DRILL	UNLOG							

There is no Pay data for this well

There is no Production Gas data for this well

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

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

There is no Production Water data for this well

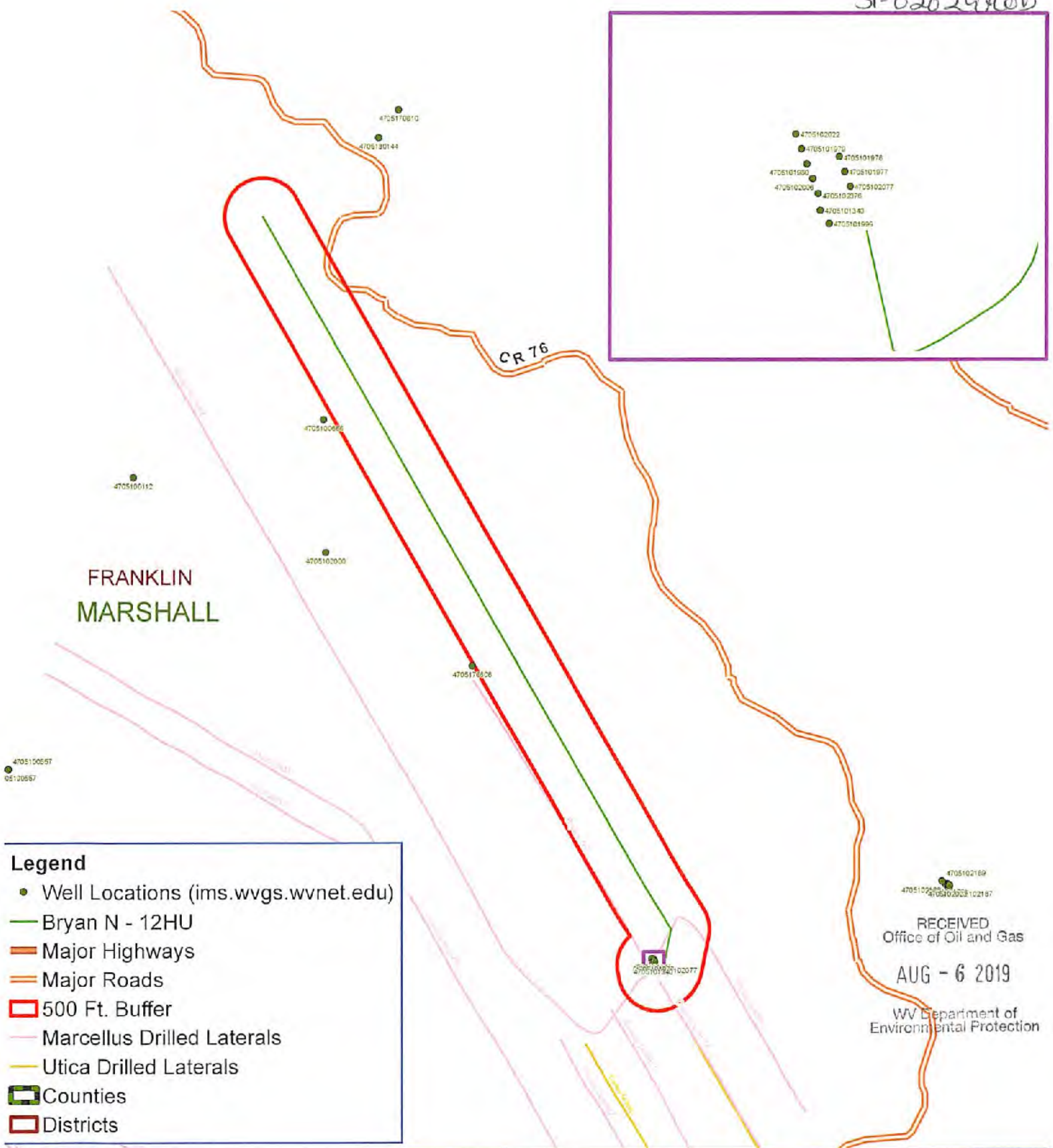
There is no Stratigraphy data for this well

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

There is no Plugging data for this well

There is no Sample data for this well

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Legend

- Well Locations (ims.wvgs.wvnet.edu)
- Bryan N - 12HU
- Major Highways
- Major Roads
- 500 Ft. Buffer
- Marcellus Drilled Laterals
- Utica Drilled Laterals
- Counties
- Districts

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Bryan N - 12HU
Franklin District
Marshall County, WV



47-051-02029400



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3/28/18

Well Site Safety Plan

Tug Hill Operating, LLC

Well Name: Bryan N-12HU

Pad Location: Bryan

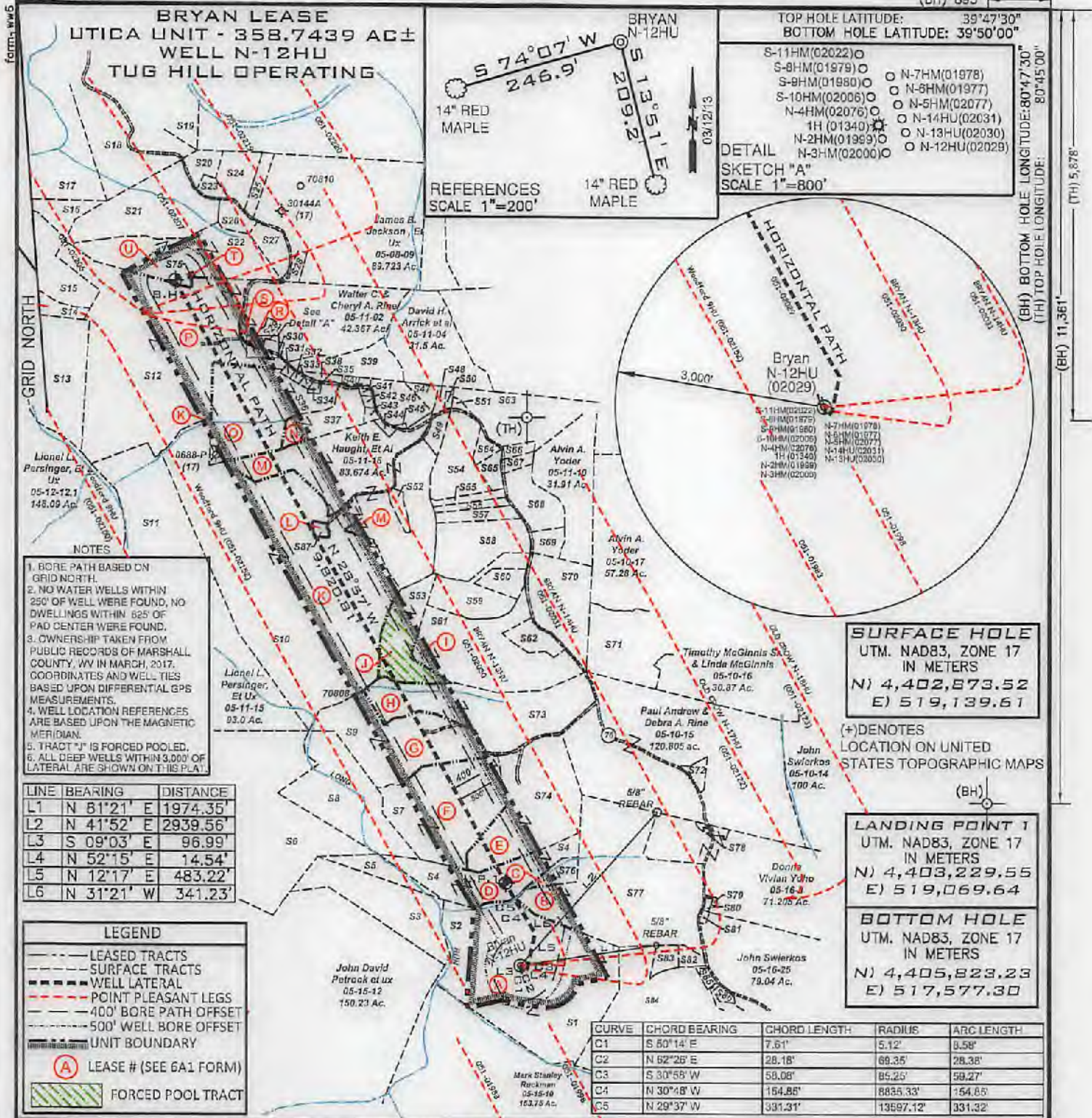
Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:

NORTHING -4,402,873.52

EASTING -519,139.61

December 2017



FILE NUMBER _____

DRAWING NUMBER **BRYAN_N-12HU_REV 3**

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 1490
Clarksburg, WV 26302
304-623-6851

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

DATE: **DECEMBER 22, 2017**

REVISED DATE: **OCTOBER 03, 2019**

OPERATORS WELL NO. **BRYAN N-12HU**

API WELL NO. **47-051-02029MOD**

STATE COUNTY PERMIT

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) _____

TARGET FORMATION **Point Pleasant** ESTIMATED DEPTH TVD: **11,393'** TMD: **21,515'**

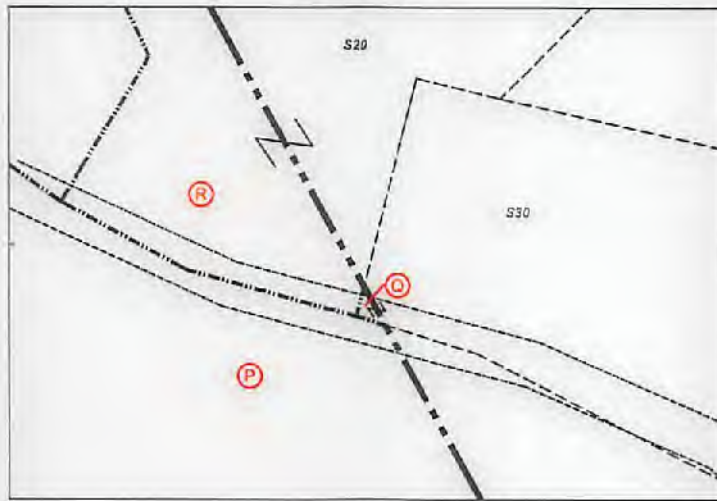
WELL OPERATOR **TUG HILL OPERATING, LLC** DESIGNATED AGENT **DIANNA STAMPER
CT CORPORATION SYSTEM**

ADDRESS **1320 SOUTH UNIVERSITY DRIVE, SUITE 500
FORT WORTH, TX 76107** ADDRESS **5400 D BIG TYLER ROAD
CHARLESTON, WV 25313**

COUNTY NAME
PERMIT

PG 2 OF 3 BRYAN LEASE
 UTICA UNIT - 358.7439 AC±
 WELL N-12HU
 TUG HILL OPERATING

Detail "A"



Number	TAX MAP -PARCEL	SURFACE OWNER	ACRES	Number	TAX MAP -PARCEL	SURFACE OWNER	ACRES
S1	A 05-15-9	CNX Land Resources	81.98	S45	05-11-5.1	James R. Anderson et ux	0.205
S2	05-15-13	CNX Land Resources	11.0	S46	05-11-5	(Part of S30) Kevin R. Corley et ux	10.36
S3	05-15-14	John David Pelrock et ux	25.0	S47	05-11-5.3	Robert Harris Arrick et ux	3.0
S4	D 05-15-6.1	Joseph J. Kramar, et ux	39.40	S48	05-11-6	Robert & Rebecca Arrick	1.29
S5	05-15-2	John David Pelrock et ux	5.0	S49	05-11-16.3	Kegan Michael Haught - Life	3.265
S6	05-15-1	Marcus Sharp & David Schlabach	121.0	S50	05-11-7	Baptist Cemetery	1.0
S7	F 05-15-5	Joseph J. Kramar, et ux	35.0	S51	05-11-8	Baptist Church	0.8
S8	05-15-3	Joseph J. Kramar et ux	36.10	S52	05-11-16.2	Joseph Haught	2.181
S9	G 05-15-4	Joseph J. Kramar, et ux	41.106	S53	J 05-11-13	Joy D. Gartman & Arlin Getts	12.29
S10	K 05-11-14	Hiram's Est. Family LTD LLP	158.054	S54	05-11-9.3	Joseph M. Haught & Staven Haught	16.3
S11	05-12-11	Wesley Bryan & Wesley Bryan II	52.478	S55	05-11-9.5	Southern Country Farms, Inc	2.559
S12	P 05-11-21	Omar Rine, Est.	112.67	S56	05-11-9.6	Southern Country Farms, Inc	2.488
S13	05-12-12	Lionel L. Persinger et ux	45.0	S57	05-11-9.9	Leonard L. Parsons, et ux	5.89
S14	05-12-10	Murray Energy	13.76	S58	05-11-9	Edwin C. & Kimberly A. Miller	41.773
S15	05-12-10.1	Murray Energy	38.48	S59	05-11-11.4	Brad M. & Amanda J. Blake	15.193
S16	05-12-9	Lionel & Mary Lee Persinger	10.15	S60	05-11-11	Brad M. & Amanda J. Blake	5.0
S17	05-7-39	Lionel L. Persinger et ux	57.0	S61	I 05-11-11.3	Herman D. Lantz & Herman J. Lantz	43.96
S18	05-7-33	William N. Roupe	24.60	S62	05-11-11.1	Nellie Marie & Robert W. Spencer	5.813
S19	05-7-31	William N. Roupe	43.147	S63	05-11-9	(Part of S49) Edwin C. & Kimberly A. Miller	41.773
S20	05-11-1	William N. & Virginia A. Roupe	4.527	S64	05-11-9.10	John A. & Janet L. Beucke	2.348
S21	05-11-1.4	Larry W. Dunlap, et al	32.498	S65	05-11-9.2	Michael R. Bryan	3.143
S22	U 05-11-1.1	Larry W. Dunlap, et al	34.405	S66	05-11-9.8	Sean F. Moore	2.070
S23	05-11-1.6	Debra Morris	2.093	S67	05-11-9.7	Sean F. Moore	2.026
S24	05-11-1.7	William S. & Mary K. Adams	8.0	S68	05-11-9.1	Jack Shephard Huggins Jr., et al	10.92
S25	05-11-1.5	Paul & Sandy Whit	3.507	S69	05-11-9.4	Jack S. Huggins et al	4.129
S26	05-11-1.3	Jay A. Conner, et ux	4.256	S70	05-11-11.2	Wesley R. Bryan & Wesley R. Bryan II	25.031
S27	05-11-1.2	Jay A. Conner, et ux	5.824	S71	05-10-16.4	Elizabeth & Melvin E. Ferguson Jr.	30.87
S28	05-8-9.1	Scott E. Jackson, Tammy S. South & Marion Jackson	1.957	S72	05-10-15.1	Donald T. Miller	2.095
S29	R 05-11-2.1	Walter C. & Cheryl A. Rine	1.19	S73	H 05-11-12	Joseph J. Kramar, et ux	43.2188
S30	Q 05-11-2.2	Joshua A. Myers	2.193	S74	E 05-15-6	Joseph J. Kramar, et ux	42.5
S31	05-11-20	David E. Gray	0.569	S75	T WITHIN 05-11-1.1	Cemetery	
S32	05-11-19	David E. Gray	0.532	S76	C 05-15-7	Terry D. Rose, et ux	4.5
S33	05-11-18	David E. Gray	0.569	S77	B 05-15-8	Terry D. Rose, et ux	77.11
S34	05-11-22	David E. Gray	0.353	S78	05-16-3.2	Jimmy Lee Ostrander Jr., Sheena Lynn Ostrander, & Brody Ray Ostrander	1.435
S35	05-11-17.1	David Gray	0.297	S79	05-16-3.1	Dennis E. Jackson, et ux	0.27
S36	O 05-11-17	Kevin R. Corley, et ux	36.13	S80	05-16-2	Christian Church	0.19
S37	N 05-11-17.2	Brenda & Michael Bryan	11.504	S81	05-16-1	Christian Church	0.50
S38	05-11-5	Kevin R. Corley et ux	10.36	S82	05-16-23.1	Ray E. Minor, et ux	2.0
S39	05-11-3	Kevin R. Corley et ux	13.18	S83	05-16-23.4	Michael R. & Brenda K. Bryan	3.0
S40	05-11-5.2	Ricky Lynn & Victoria Rose Cross	1.0	S84	05-16-23	CNX Land Resources, Inc.	60.138
S41	05-11-24	Charles Edward Furbee et ux	0.603	S85	05-16-23.3	Greg & Christina Riddle	1.0
S42	05-11-23	Owen Michael Barr	0.845	S86	05-16-24	Alan M. Beyser, et ux	1.083
S43	05-11-25	Owen Michael Barr	0.598	S87	L 05-11-14.1	Dennis F. Moore, et ux	1.056
S44	05-11-16.1	Susan Marie Smith - Life	0.876				



47-051-02029-M00

P.S. 708 *David L Jackson*

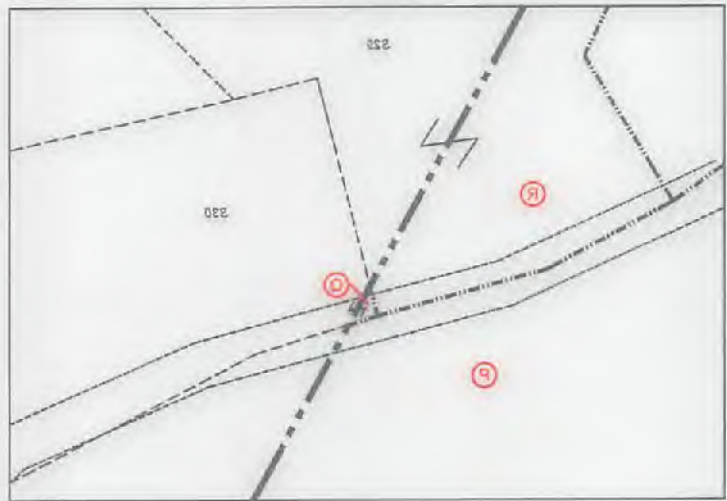


TUG HILL
 OPERATING

OPERATOR'S
 WELL #: Bryan N-12HU
 DISTRICT: Franklin
 COUNTY: Marshall
 STATE: WV

WELL PLAT
 PAGE 2 OF 3
 DATE: 12/22/2017
 REVISED DATE:
10/03/2019

Detail "A"



Number	TAX MAP-PARCEL	SURFACE OWNER	ACRES	Number	TAX MAP-PARCEL	SURFACE OWNER	ACRES
244	05-11-18.1	Susan Mabe Smith - Life	0.878	287	05-11-14.1	Dennis F. Moore, et ux	1.088
243	05-11-25	Owen Michael Bar	0.598	287	05-11-14.1	Dennis F. Moore, et ux	1.088
242	05-11-23	Owen Michael Bar	0.842	288	05-18-24	Alan M. Beyer, et ux	1.083
241	05-11-24	Charles Edward Fubee et ux	0.803	285	05-18-23.2	Greg & Christina Riddle	1.0
240	05-11-22	Ricky Lynn & Victoria Rose Cross	1.0	284	05-18-22	CNX Land Resources, Inc.	80.138
239	05-11-3	Kevin R. Cohey et ux	13.18	283	05-18-23.4	Michael R. & Brenda K. Bryan	3.0
238	05-11-2	Kevin R. Cohey et ux	10.38	282	05-18-23.1	Ray E. Minor, et ux	2.0
237	05-11-17.2	Brenda & Michael Bryan	11.804	281	05-18-1	Christian Church	0.50
236	05-11-17	Kevin R. Cohey, et ux	38.13	280	05-18-2	Christian Church	0.19
235	05-11-17.1	David Gray	0.297	279	05-18-3.1	Dennis E. Jackson, et ux	0.27
234	05-11-22	David E. Gray	0.252	278	05-18-3.2	Jimmy Lee Oatlander, Jr., Sheena Lynn Oatlander & Brody Ray Oatlander	1.435
233	05-11-18	David E. Gray	0.588	278	05-18-3.2	Jimmy Lee Oatlander, Jr., Sheena Lynn Oatlander & Brody Ray Oatlander	1.435
232	05-11-18	David E. Gray	0.532	277	05-18-8	Terry D. Rose, et ux	77.11
231	05-11-20	David E. Gray	0.588	276	05-18-7	Terry D. Rose, et ux	4.5
230	05-11-22	Lois A. Myers	2.192	275	05-11-1.1	Cemetary	
229	05-11-2.1	Walter C. & Cheryl A. Rine	1.19	274	05-18-8	Joseph J. Kramar, et ux	42.5
228	05-8-8.1	Scott E. Jackson, Tammy S. South & Mark Jackson	1.857	272	05-10-18.1	Donald T. Miller	2.092
227	05-11-1.2	Lay A. Corner, et ux	2.824	271	05-10-18.4	Elizabeth & Melvin E. Ferguson, Jr.	30.87
226	05-11-1.3	Lay A. Corner, et ux	4.286	270	05-11-11.2	Wesley R. Bryan & Wesley R. Bryan II	25.031
225	05-11-1.5	Paul & Sandy Whit	3.507	269	05-11-9.4	Jack S. Huggins et al	4.129
224	05-11-1.7	William S. & Mary K. Adams	8.0	268	05-11-9.1	Jack Shephard Huggins, Jr. et al	10.92
223	05-11-1.8	Debra Morda	2.093	267	05-11-9.7	Sean F. Moore	2.028
222	05-11-1.1	Larry W. Dunlap, et al	24.405	266	05-11-9.8	Sean F. Moore	2.070
221	05-11-1.4	Larry W. Dunlap, et al	32.498	265	05-11-9.2	Michael R. Bryan	3.143
220	05-11-1	William N. & Virginia A. Rouse	4.527	264	05-11-9.10	John A. & Janet L. Baucke	2.448
219	05-7-31	William N. Rouse	43.147	263	05-11-9	(Part of 248) Edwin C. & Kimberly A. Miller	41.773
218	05-7-33	William N. Rouse	24.80	262	05-11-11.1	Nelle Mabe & Robert W. Spencer	2.813
217	05-7-39	Lonel J. Peninger et ux	57.0	261	05-11-11.3	Herman D. Lantz & Herman J. Lantz	43.96
216	05-12-9	Lonel & Mary Lee Peninger	10.12	260	05-11-11	Brad M. & Amanda J. Blake	5.0
215	05-12-10.1	Munsey Energy	38.48	259	05-11-11.4	Brad M. & Amanda J. Blake	18.183
214	05-12-10	Munsey Energy	13.76	258	05-11-9	Edwin C. & Kimberly A. Miller	41.773
213	05-12-12	Lonel J. Peninger et ux	45.0	257	05-11-9.9	Leonard L. Parsons, et ux	5.89
212	05-12-21	Omar Rine, Est.	112.87	256	05-11-9.6	Southern County Farms, Inc	2.488
211	05-12-11	Wesley Bryan & Wesley Bryan II	52.478	255	05-11-9.5	Southern County Farms, Inc	2.559
210	05-11-14	Hilmar's Est. Family LTD L.P.	158.054	254	05-11-9.3	Joseph M. Haight & Steven Haight	18.3
209	05-12-4	Joseph J. Kramar, et ux	41.108	253	05-11-13	Joy D. Gerhart & Ahlin Gatta	12.29
208	05-12-3	Joseph J. Kramar, et ux	35.10	252	05-11-18.2	Joseph Haight	0.8
207	05-12-2	Joseph J. Kramar, et ux	35.0	251	05-11-8	Rapier Church	0.8
206	05-12-1	Marcus Sharp & David Schlaebach	121.0	250	05-11-7	Baptist Cemetary	1.0
205	05-12-2	John David Patrick et ux	5.0	249	05-11-18.3	Keegan Michael Haight - Life	2.262
204	05-12-8.1	Joseph J. Kramar, et ux	39.40	248	05-11-8	Robert & Rebecca Amick	1.29
203	05-12-14	John David Patrick et ux	25.0	247	05-11-8.3	Robert Harris Amick et ux	3.0
202	05-12-13	CNX Land Resources	11.0	246	05-11-2	(Part of 230) Kevin R. Cohey et ux	10.36
201	05-12-9	CNX Land Resources	81.98	245	05-11-2.1	James R. Anderson et ux	0.202

47-021-0208-MOD

David E. Jackson
P.S. 108



STATE: WV
 COUNTY: Marshall
 DISTRICT: Franklin
 WELL #: Bryan N-12HU
 OPERATOR'S: TUG HILL OPERATING

REVISID DATE: 10/03/2019
 DATE: 12/22/2017
 PAGE 3 OF 3
 WELL PLAT



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

RECEIVED
Office of Oil and Gas

AUG - 6 2019

WV Department of
Environmental Protection