



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, October 29, 2018
WELL WORK PERMIT
Horizontal 6A / New Drill

TUG HILL OPERATING, LLC
380 SOUTHPOINTE BLVD

CANONSBURG, PA 15317

Re: Permit approval for LACKAWANNA N-5HM
47-103-03249-00-00

This well work permit is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to any additional specific conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas Inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days of completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
Chief

A handwritten signature in blue ink, appearing to read 'James A. Martin', is positioned to the right of the printed name and title.

Operator's Well Number: LACKAWANNA N-5HM
Farm Name: M.B. INVESTMENTS
U.S. WELL NUMBER: 47-103-03249-00-00
Horizontal 6A New Drill
Date Issued: 10/29/2018

Promoting a healthy environment.

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than one hundred (100) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. 24 hours prior to the initiation of the completion process the operator shall notify the Chief or his designee.
8. During the completion process the operator shall monitor annular pressures and report any anomaly noticed to the chief or his designee immediately.
9. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
10. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

API Number: 4710303249

PERMIT CONDITIONS

11. The operator shall provide to the Office of Oil and Gas the dates of each of the following within 30 days of their occurrence: completion of construction of the well pad, commencement of drilling, cessation of drilling, completion of any other permitted well work, and completion of the well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov.

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 Wetzel Magnolia Porters Falls
Operator ID County District Quadrangle

2) Operator's Well Number: Lackawanna N-5HM Well Pad Name: Lackawanna

3) Farm Name/Surface Owner: Wetzel County Sanitary Landfill Public Road Access: County Route 30

4) Elevation, current ground: 1306' Elevation, proposed post-construction: 1306'

5) Well Type (a) Gas Oil Underground Storage

Other _____

(b) If Gas Shallow Deep

Horizontal _____

6) Existing Pad: Yes or No Yes

*DMH
8-8-18*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus is the target formation at a depth of 6760 - 6811' thickness of 51' and anticipated pressure of approx. 3800 psi

8) Proposed Total Vertical Depth: 6,902'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 14,875'

11) Proposed Horizontal Leg Length: 7,201.34'

12) Approximate Fresh Water Strata Depths: 70', 1116'

13) Method to Determine Fresh Water Depths: Use shallow offset wells to determine deepest freshwater. Or determine using predrill tests, testing while drilling or petrophysical evaluation of resistivity.

14) Approximate Saltwater Depths: 2,167'

15) Approximate Coal Seam Depths: Sewickly Coal - 1016' and Pittsburgh Coal - 1111'

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

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

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	NEW	BW	BW	120'	120'	259ft^3(CTS)
Fresh Water	13 3/8"	NEW	H40	48#	1,200'	1,200'	1184ft^3(CTS)
Coal	13 3/8"	NEW	H40	48#	1,200'	1,200'	1184ft^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#	2,800'	2,800'	936ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	14,875'	14,875'	3804ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#		7,055'	
Liners							

*DMH
8-8-18*

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	36"	1.0	2,333	1,866	CLASS A	1.2
Fresh Water	13 3/8"	17 1/2"	.33	1,730	1,384	SEE #24	1.2
Coal	13 3/8"	17 1/2"	.33	1,730	1,384	SEE#24	1.2
Intermediate	9 5/8"	12 1/4"	.352	3,520	2,816	SEE#24	1.19
Production	5 1/2"	8 7/8_8 3/4	.361	12,640	9,000	SEE#24	1.17/1.19
Tubing	2 3/8"		.19	11,200	8,960		
Liners							

PACKERS

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

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

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

*DMH
8-8-19*

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

Well to be completed with approximately 19,125,000 lb proppant and 295,686 bbl of water. Max rate = 80 bpm; max psi = 9,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 26.69 acres

22) Area to be disturbed for well pad only, less access road (acres): 4.32 acres

23) Describe centralizer placement for each casing string:

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

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

*See Attachment

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25) Proposed borehole conditioning procedures:

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

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*Note: Attach additional sheets as needed.

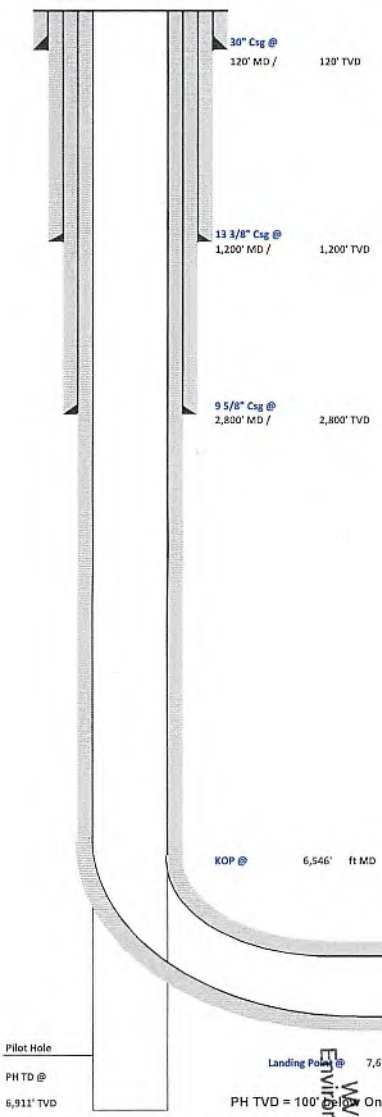


WELL NAME: Lackawanna N-5HM
 STATE: WV COUNTY: Wetzel
 DISTRICT: Magnolia
 DF Elev: 1,306' GL Elev: 1,306'
 TD: 14,875'
 TH Latitude: 39.60608977
 TH Longitude: -80.85673178
 BH Latitude: 39.62242049
 BH Longitude: -80.86904841

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	1116
Sewickley Coal	1016
Pittsburgh Coal	1111
Big Lime	2141
Welr	2602
Berea	2794
Gordon	3175
Rhinestreet	6085
Genesee/Burkett	6588
Tully	6640
Hamilton	6653
Marcellus	6760
Landing Depth	6774
Onondaga	6811
Pilot Hole Depth	6911

CASING SUMMARY							
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Depth (TVD)	Weight (lb/ft)	Grade	Top of Cement
Conductor	36	30	120'	120'	8W	8W	Surface
Surface	17.5	13 3/8	1,200'	1,200'	54.5	J55	Surface
Intermediate 1	12 1/4	9 5/8	2,800'	2,800'	36	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	14,875'	6,648'	20	CYNP110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	338	A	15.6	Air	None
Surface	1,203	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	906	A	15	Air	1 Centralizer every other jt
Production	3,356	A	14.5	Air / SOBMM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc



DMH 8-8-18

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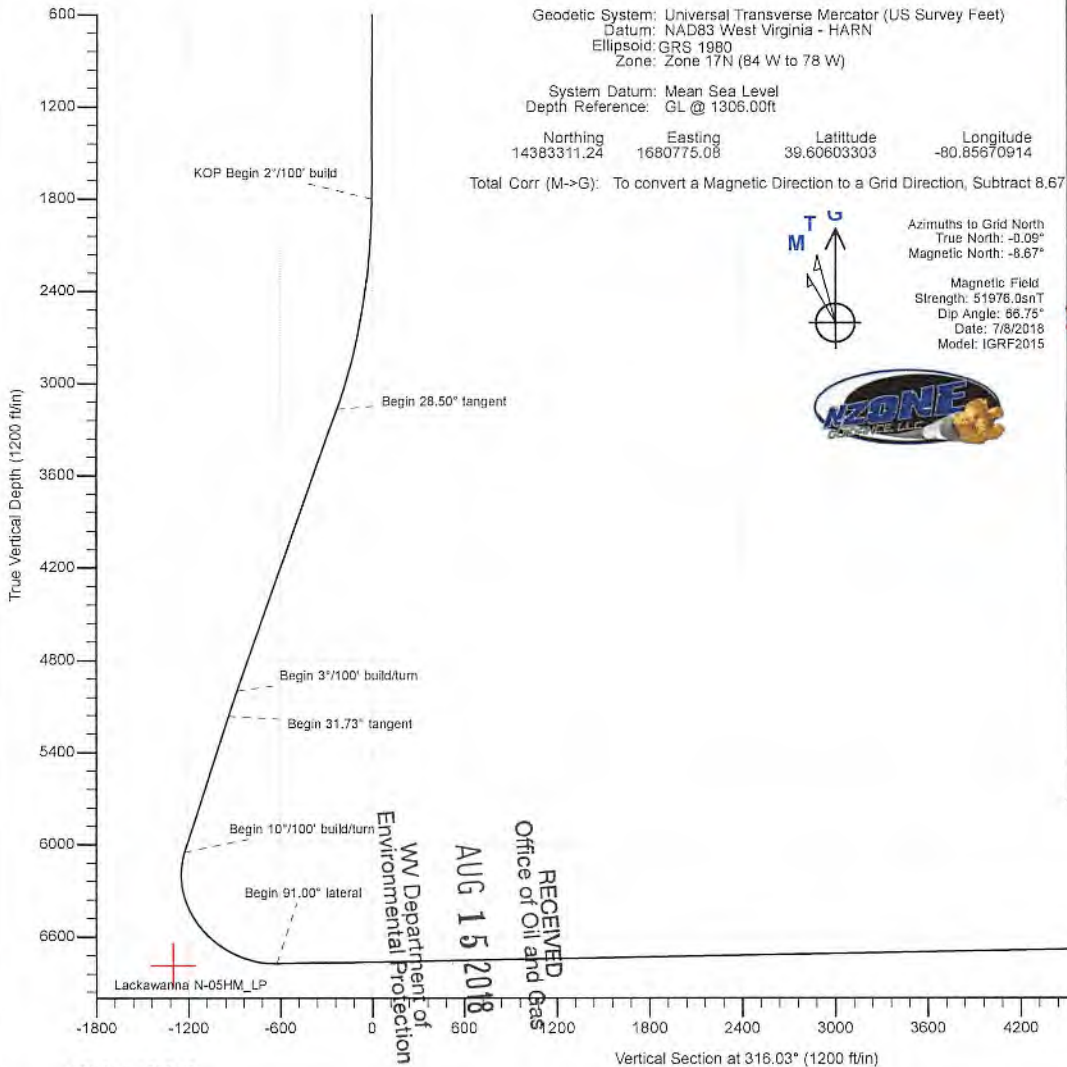
Lateral TD @ 14,875' ft MD
 6,648' ft TVD



Well: Lackawanna N-05 HM (slot BB)
 Site: Lackawanna
 Project: Wetzel County, West Virginia (UTM17 NAD83)
 Design: rev0
 Rig:

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1800.00	0.00	0.00	1800.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2°/100' build
3	3225.00	28.50	185.00	3166.96	-345.84	-30.26	2.00	185.00	-227.91	Begin 28.50° tangent
4	5310.80	28.50	185.00	5000.00	-1337.32	-117.00	0.00	0.00	-881.28	Begin 3°/100' build/turn
5	5503.62	31.73	194.59	5166.87	-1432.29	-133.79	3.00	60.36	-937.98	Begin 31.73° tangent
6	6546.27	31.73	194.59	6053.70	-1962.92	-271.90	0.00	0.00	-1224.01	Begin 10°/100' build/turn
7	7875.38	91.00	330.00	6773.66	-1654.44	-818.40	10.00	130.36	-622.58	Begin 91.00° lateral
8	14875.38	91.00	330.00	6648.00	4579.99	-4417.85	0.00	0.00	6363.47	PBHL/TD 14875.38 MD/6648.00 TVD



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: GL @ 1306.00ft

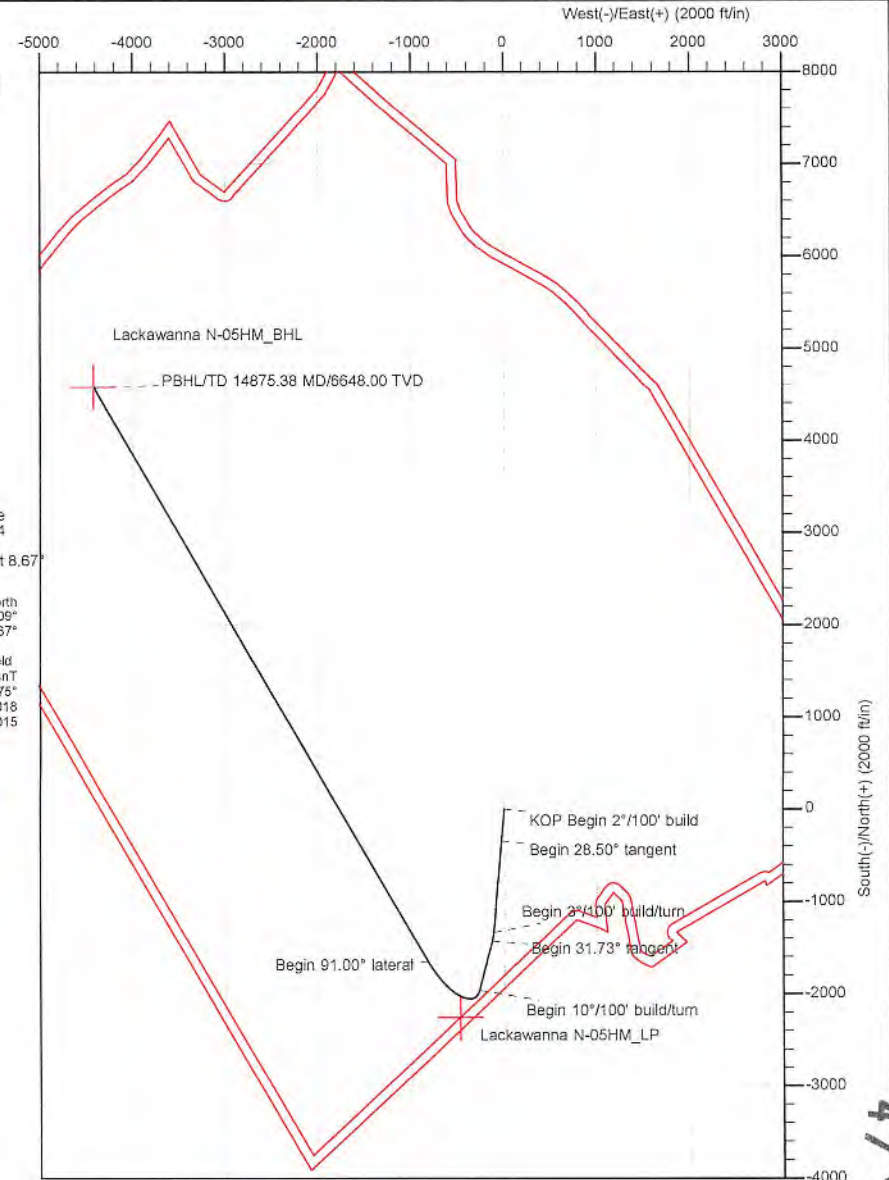
Northing: 14383311.24 Easting: 1680775.08 Latitude: 39.60603303 Longitude: -80.85670914

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.67°



Azimuths to Grid North
 True North: -0.09°
 Magnetic North: -8.67°

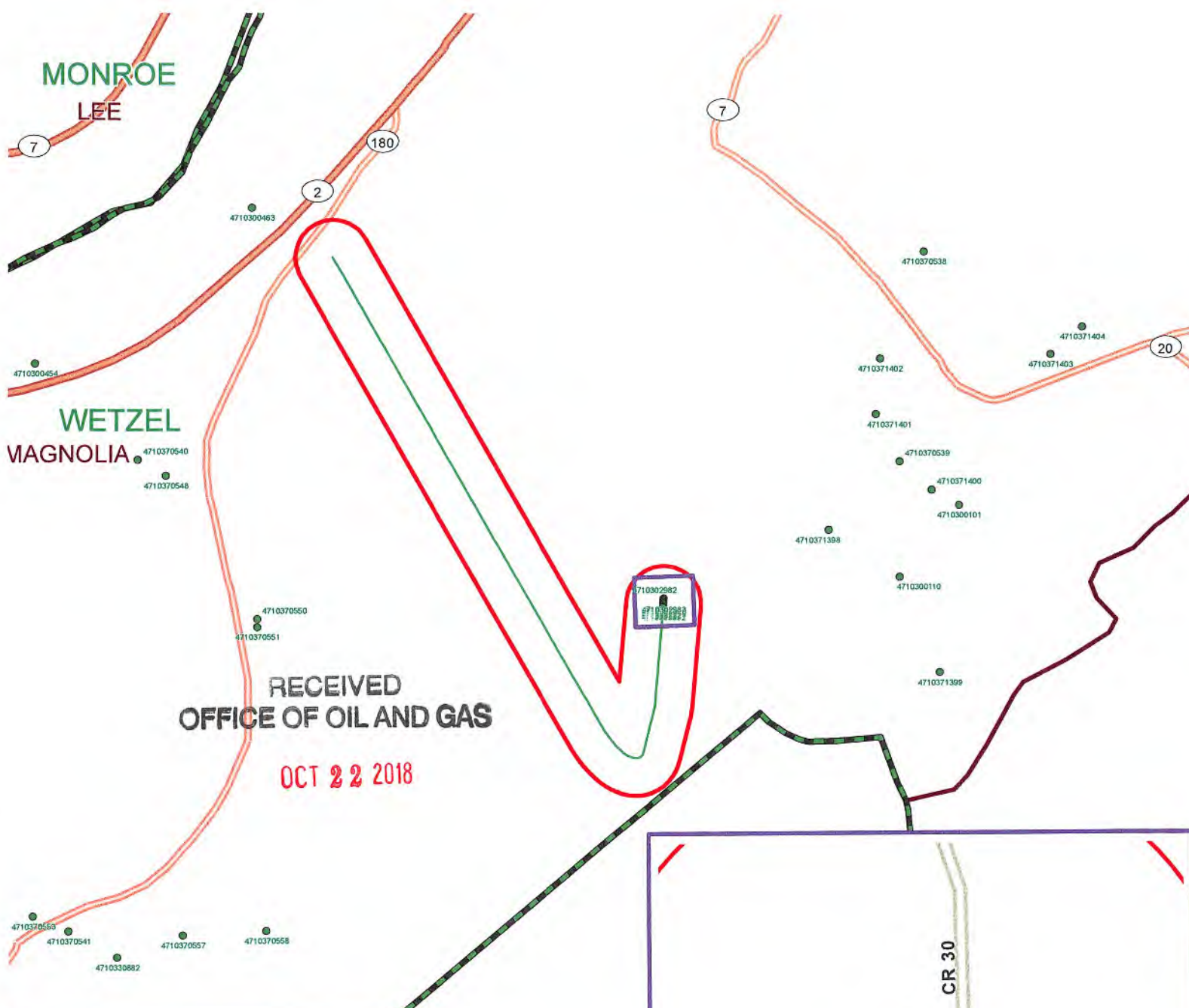
Magnetic Field
 Strength: 51976.0snT
 Dip Angle: 66.75°
 Date: 7/8/2018
 Model: IGRF2015



PBHL/TD 14875.38 MD/6648.00 TVD
 Lackawanna N-05HM_BHL

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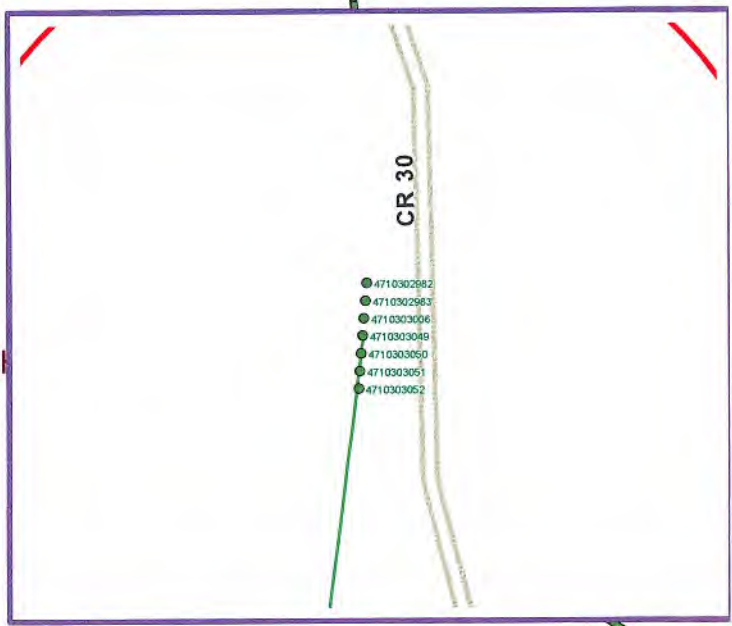
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Legend

- Well Locations (ims.wvgs.wvnet.edu)
- Lackawanna N - 5HM
- 500 Ft. Buffer
- Major Highways
- Major Roads
- ▭ Counties
- ▭ Districts



Lackawanna N - 5HM Magnolia District Wetzel County, WV



Map Created: August 6, 2018

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



4710303249

Database:	DB_Aug0116_LT_v14	Local Co-ordinate Reference:	Well Lackawanna N-05 HM (slot BB)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1306.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1306.00ft
Site:	Lackawanna	North Reference:	Grid
Well:	Lackawanna N-05 HM (slot BB)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Project	Wetzel County, West Virginia (UTM17 NAD83)		
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	Lackawanna				
Site Position:		Northing:	14,383,374.84 usft	Latitude:	39.60620769
From:	Lat/Long	Easting:	1,680,777.71 usft	Longitude:	-80.85669942
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.09 °

Well	Lackawanna N-05 HM (slot BB)					
Well Position	+N/-S	0.00 ft	Northing:	14,383,311.24 usft	Latitude:	39.60603303
	+E/-W	0.00 ft	Easting:	1,680,775.08 usft	Longitude:	-80.85670914
Position Uncertainty		0.00 ft	Wellhead Elevation:		Ground Level:	1,306.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	7/8/2018	-8.58	66.75	51,976.02325707

Design	rev0			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	316.03

Plan Survey Tool Program	Date	7/17/2018		
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	14,875.38 rev0 (Original Hole)	MWD MWD - Standard	

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,225.00	28.50	185.00	3,166.96	-345.84	-30.26	2.00	2.00	0.00	185.00	
5,310.80	28.50	185.00	5,000.00	-1,337.32	-117.00	0.00	0.00	0.00	0.00	
5,503.62	31.73	194.59	5,166.87	-1,432.29	-133.79	3.00	1.67	4.97	60.36	
6,546.27	31.73	194.59	6,053.70	-1,962.92	-271.90	0.00	0.00	0.00	0.00	
7,675.38	91.00	330.00	6,773.66	-1,654.44	-818.40	10.00	5.25	11.99	130.36	
14,875.38	91.00	330.00	6,648.00	4,579.99	-4,417.85	0.00	0.00	0.00	0.00	Lackawanna N-05HM

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Planning Report - Geographic

Database:	DB_Aug0116_LT_v14	Local Co-ordinate Reference:	Well Lackawanna N-05 HM (slot BB)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1306.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1306.00ft
Site:	Lackawanna	North Reference:	Grid
Well:	Lackawanna N-05 HM (slot BB)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
100.00	0.00	0.00	100.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
200.00	0.00	0.00	200.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
300.00	0.00	0.00	300.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
400.00	0.00	0.00	400.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
500.00	0.00	0.00	500.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
600.00	0.00	0.00	600.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
700.00	0.00	0.00	700.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
800.00	0.00	0.00	800.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
900.00	0.00	0.00	900.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
1,400.00	0.00	0.00	1,400.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
1,600.00	0.00	0.00	1,600.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
1,700.00	0.00	0.00	1,700.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
1,800.00	0.00	0.00	1,800.00	0.00	0.00	14,383,311.24	1,680,775.08	39.60603303	-80.85670914	
KOP Begin 2°/100' build										
1,900.00	2.00	185.00	1,899.98	-1.74	-0.15	14,383,309.50	1,680,774.92	39.60602826	-80.85670969	
2,000.00	4.00	185.00	1,999.84	-6.95	-0.81	14,383,304.29	1,680,774.47	39.60601394	-80.85671134	
2,100.00	6.00	185.00	2,099.45	-15.63	-1.37	14,383,295.61	1,680,773.71	39.60599010	-80.85671409	
2,200.00	8.00	185.00	2,198.70	-27.77	-2.43	14,383,283.47	1,680,772.65	39.60595676	-80.85671793	
2,300.00	10.00	185.00	2,297.47	-43.36	-3.79	14,383,267.88	1,680,771.28	39.60591397	-80.85672285	
2,400.00	12.00	185.00	2,395.62	-62.36	-5.46	14,383,248.88	1,680,769.62	39.60586178	-80.85672887	
2,500.00	14.00	185.00	2,493.06	-84.77	-7.42	14,383,226.47	1,680,767.66	39.60580025	-80.85673595	
2,600.00	16.00	185.00	2,589.64	-110.55	-9.67	14,383,200.69	1,680,765.40	39.60572945	-80.85674411	
2,700.00	18.00	185.00	2,685.27	-139.68	-12.22	14,383,171.56	1,680,762.86	39.60564947	-80.85675332	
2,800.00	20.00	185.00	2,779.82	-172.11	-15.06	14,383,139.13	1,680,760.02	39.60556042	-80.85676358	
2,900.00	22.00	185.00	2,873.17	-207.81	-18.18	14,383,103.43	1,680,756.90	39.60546239	-80.85677487	
3,000.00	24.00	185.00	2,965.21	-246.73	-21.59	14,383,064.51	1,680,753.49	39.60535551	-80.85678718	
3,100.00	26.00	185.00	3,055.84	-288.83	-25.27	14,383,022.41	1,680,749.81	39.60523991	-80.85680049	
3,200.00	28.00	185.00	3,144.94	-334.05	-29.23	14,382,977.19	1,680,745.85	39.60511572	-80.85681480	
3,225.00	28.50	185.00	3,166.96	-345.84	-30.26	14,382,965.40	1,680,744.82	39.60508335	-80.85681852	
Begin 28.50° tangent										
3,300.00	28.50	185.00	3,232.87	-381.49	-33.38	14,382,929.75	1,680,741.70	39.60498546	-80.85682980	
3,400.00	28.50	185.00	3,320.75	-429.03	-37.54	14,382,882.22	1,680,737.54	39.60485493	-80.85684483	
3,500.00	28.50	185.00	3,408.63	-476.56	-41.69	14,382,834.68	1,680,733.38	39.60472440	-80.85685987	
3,600.00	28.50	185.00	3,496.52	-524.10	-45.85	14,382,787.15	1,680,729.22	39.60459387	-80.85687490	
3,700.00	28.50	185.00	3,584.40	-571.63	-50.01	14,382,739.61	1,680,725.06	39.60446334	-80.85688993	
3,800.00	28.50	185.00	3,672.28	-619.16	-54.17	14,382,692.08	1,680,720.91	39.60433281	-80.85690497	
3,900.00	28.50	185.00	3,760.16	-666.70	-58.33	14,382,644.54	1,680,716.75	39.60420229	-80.85692000	
4,000.00	28.50	185.00	3,848.04	-714.23	-62.49	14,382,597.01	1,680,712.59	39.60407176	-80.85693504	
4,100.00	28.50	185.00	3,935.92	-761.77	-66.65	14,382,549.48	1,680,708.43	39.60394123	-80.85695007	
4,200.00	28.50	185.00	4,023.81	-809.30	-70.80	14,382,501.94	1,680,704.27	39.60381070	-80.85696510	
4,300.00	28.50	185.00	4,111.69	-856.84	-74.96	14,382,454.41	1,680,700.11	39.60368017	-80.85698014	
4,400.00	28.50	185.00	4,199.57	-904.37	-79.12	14,382,406.87	1,680,695.95	39.60354964	-80.85699517	
4,500.00	28.50	185.00	4,287.45	-951.90	-83.28	14,382,359.34	1,680,691.80	39.60341912	-80.85701020	
4,600.00	28.50	185.00	4,375.33	-999.44	-87.44	14,382,311.80	1,680,687.64	39.60328859	-80.85702524	
4,700.00	28.50	185.00	4,463.21	-1,046.97	-91.60	14,382,264.27	1,680,683.48	39.60315806	-80.85704027	
4,800.00	28.50	185.00	4,551.10	-1,094.51	-95.76	14,382,216.74	1,680,679.32	39.60302753	-80.85705530	
4,900.00	28.50	185.00	4,638.98	-1,142.04	-99.92	14,382,169.20	1,680,675.16	39.60289700	-80.85707033	

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Planning Report - Geographic

Database:	DB_Aug0116_LT_v14	Local Co-ordinate Reference:	Well Lackawanna N-05 HM (slot BB)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1306.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1306.00ft
Site:	Lackawanna	North Reference:	Grid
Well:	Lackawanna N-05 HM (slot BB)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
5,000.00	28.50	185.00	4,726.86	-1,189.58	-104.07	14,382,121.67	1,680,671.00	39.60276647	-80.85708537	
5,100.00	28.50	185.00	4,814.74	-1,237.11	-108.23	14,382,074.13	1,680,666.84	39.60263594	-80.85710040	
5,200.00	28.50	185.00	4,902.62	-1,284.64	-112.39	14,382,026.60	1,680,662.68	39.60250542	-80.85711543	
5,300.00	28.50	185.00	4,990.50	-1,332.18	-116.55	14,381,979.07	1,680,658.53	39.60237489	-80.85713047	
5,310.80	28.50	185.00	5,000.00	-1,337.32	-117.00	14,381,973.93	1,680,658.08	39.60236078	-80.85713209	
Begin 3°/100' build/tum										
5,400.00	29.91	189.67	5,077.87	-1,380.44	-122.59	14,381,930.80	1,680,652.49	39.60224237	-80.85715218	
5,500.00	31.66	194.43	5,163.79	-1,430.45	-133.32	14,381,880.80	1,680,641.76	39.60210508	-80.85719054	
5,503.62	31.73	194.59	5,166.87	-1,432.29	-133.79	14,381,878.96	1,680,641.28	39.60210002	-80.85719225	
Begin 31.73° tangent										
5,600.00	31.73	194.59	5,248.84	-1,481.34	-146.56	14,381,829.91	1,680,628.52	39.60196537	-80.85723785	
5,700.00	31.73	194.59	5,333.90	-1,532.23	-159.80	14,381,779.01	1,680,615.27	39.60182566	-80.85728516	
5,800.00	31.73	194.59	5,418.95	-1,583.12	-173.05	14,381,728.12	1,680,602.03	39.60168595	-80.85733247	
5,900.00	31.73	194.59	5,504.01	-1,634.02	-186.30	14,381,677.23	1,680,588.78	39.60154623	-80.85737978	
6,000.00	31.73	194.59	5,589.07	-1,684.91	-199.54	14,381,626.33	1,680,575.53	39.60140652	-80.85742709	
6,100.00	31.73	194.59	5,674.12	-1,735.80	-212.79	14,381,575.44	1,680,562.29	39.60126681	-80.85747440	
6,200.00	31.73	194.59	5,759.18	-1,786.70	-226.03	14,381,524.55	1,680,549.04	39.60112709	-80.85752171	
6,300.00	31.73	194.59	5,844.23	-1,837.59	-239.28	14,381,473.66	1,680,535.80	39.60098738	-80.85756903	
6,400.00	31.73	194.59	5,929.29	-1,888.48	-252.52	14,381,422.76	1,680,522.55	39.60084766	-80.85761634	
6,500.00	31.73	194.59	6,014.34	-1,939.38	-265.77	14,381,371.87	1,680,509.31	39.60070795	-80.85766365	
6,546.27	31.73	194.59	6,053.70	-1,962.92	-271.90	14,381,348.32	1,680,503.18	39.60064331	-80.85768554	
Begin 10°/100' build/tum										
6,600.00	28.51	203.19	6,100.19	-1,988.40	-280.51	14,381,322.84	1,680,494.56	39.60057337	-80.85771626	
6,700.00	24.44	223.82	6,189.87	-2,025.36	-304.29	14,381,285.88	1,680,470.78	39.60047196	-80.85780089	
6,800.00	23.87	248.37	6,281.35	-2,047.81	-337.51	14,381,263.44	1,680,437.57	39.60041047	-80.85791895	
6,900.00	27.04	270.59	6,371.83	-2,055.05	-379.16	14,381,256.20	1,680,395.92	39.60039076	-80.85806684	
7,000.00	32.87	286.97	6,458.58	-2,046.87	-427.97	14,381,264.37	1,680,347.11	39.60041343	-80.85824009	
7,100.00	40.22	298.42	6,538.95	-2,023.52	-482.46	14,381,287.72	1,680,292.61	39.60047779	-80.85843342	
7,200.00	48.39	306.71	6,610.51	-1,985.71	-540.98	14,381,325.53	1,680,234.09	39.60058188	-80.85864096	
7,300.00	57.02	313.08	6,671.08	-1,934.59	-601.75	14,381,376.66	1,680,173.33	39.60072255	-80.85885640	
7,400.00	65.92	318.29	6,718.82	-1,871.71	-662.92	14,381,439.54	1,680,112.16	39.60089552	-80.85907320	
7,500.00	74.97	322.82	6,752.27	-1,798.97	-722.62	14,381,512.27	1,680,052.45	39.60109553	-80.85928478	
7,600.00	84.10	326.97	6,770.43	-1,718.60	-779.06	14,381,592.64	1,679,996.02	39.60131650	-80.85946469	
7,675.38	91.00	330.00	6,773.66	-1,654.44	-818.40	14,381,656.81	1,679,956.68	39.60149188	-80.85962398	
Begin 91.00° lateral										
7,700.00	91.00	330.00	6,773.23	-1,633.12	-830.70	14,381,678.12	1,679,944.37	39.60155144	-80.85966756	
7,800.00	91.00	330.00	6,771.48	-1,546.53	-880.70	14,381,764.71	1,679,894.38	39.60178949	-80.85981456	
7,900.00	91.00	330.00	6,769.74	-1,459.94	-930.69	14,381,851.30	1,679,844.39	39.60202751	-80.86000159	
8,000.00	91.00	330.00	6,767.99	-1,373.36	-980.68	14,381,937.89	1,679,794.40	39.60226551	-80.86019857	
8,100.00	91.00	330.00	6,766.25	-1,286.77	-1,030.67	14,382,024.48	1,679,744.41	39.60250355	-80.86037558	
8,200.00	91.00	330.00	6,764.50	-1,200.18	-1,080.67	14,382,111.07	1,679,694.41	39.60274157	-80.86055259	
8,300.00	91.00	330.00	6,762.76	-1,113.59	-1,130.66	14,382,197.66	1,679,644.42	39.60297959	-80.86072960	
8,400.00	91.00	330.00	6,761.01	-1,027.00	-1,180.65	14,382,284.25	1,679,594.43	39.60321761	-80.86090661	
8,500.00	91.00	330.00	6,759.27	-940.41	-1,230.64	14,382,370.84	1,679,544.44	39.60345563	-80.86108363	
8,600.00	91.00	330.00	6,757.52	-853.82	-1,280.63	14,382,457.42	1,679,494.44	39.60369365	-80.86126064	
8,700.00	91.00	330.00	6,755.78	-767.23	-1,330.63	14,382,544.01	1,679,444.45	39.60393167	-80.86143765	
8,800.00	91.00	330.00	6,754.03	-680.64	-1,380.62	14,382,630.60	1,679,394.46	39.60416968	-80.86161467	
8,900.00	91.00	330.00	6,752.28	-594.05	-1,430.61	14,382,717.19	1,679,344.47	39.60440770	-80.86179169	
9,000.00	91.00	330.00	6,750.54	-507.46	-1,480.60	14,382,803.78	1,679,294.47	39.60464572	-80.86196871	
9,100.00	91.00	330.00	6,748.79	-420.87	-1,530.60	14,382,890.37	1,679,244.48	39.60488374	-80.86214573	
9,200.00	91.00	330.00	6,747.05	-334.28	-1,580.59	14,382,976.96	1,679,194.49	39.60512175	-80.86232275	
9,300.00	91.00	330.00	6,745.30	-247.69	-1,630.58	14,383,063.55	1,679,144.50	39.60535977	-80.86249977	
9,400.00	91.00	330.00	6,743.56	-161.10	-1,680.57	14,383,150.14	1,679,094.51	39.60559779	-80.86267679	

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Planning Report - Geographic

Database:	DB_Aug0116_LT_v14	Local Co-ordinate Reference:	Well Lackawanna N-05 HM (slot BB)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1306.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1306.00ft
Site:	Lackawanna	North Reference:	Grid
Well:	Lackawanna N-05 HM (slot BB)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,500.00	91.00	330.00	6,741.81	-74.51	-1,730.57	14,383,236.73	1,679,044.51	39.60583580	-80.86285382
9,600.00	91.00	330.00	6,740.07	12.07	-1,780.56	14,383,323.32	1,678,994.52	39.60607382	-80.86303085
9,700.00	91.00	330.00	6,738.32	98.66	-1,830.55	14,383,409.91	1,678,944.53	39.60631183	-80.86320787
9,800.00	91.00	330.00	6,736.58	185.25	-1,880.54	14,383,496.49	1,678,894.54	39.60654985	-80.86338490
9,900.00	91.00	330.00	6,734.83	271.84	-1,930.54	14,383,583.08	1,678,844.54	39.60678786	-80.86356193
10,000.00	91.00	330.00	6,733.09	358.43	-1,980.53	14,383,669.67	1,678,794.55	39.60702588	-80.86373896
10,100.00	91.00	330.00	6,731.34	445.02	-2,030.52	14,383,756.26	1,678,744.56	39.60726389	-80.86391599
10,200.00	91.00	330.00	6,729.60	531.61	-2,080.51	14,383,842.85	1,678,694.57	39.60750190	-80.86409303
10,300.00	91.00	330.00	6,727.85	618.20	-2,130.51	14,383,929.44	1,678,644.57	39.60773992	-80.86427006
10,400.00	91.00	330.00	6,726.11	704.79	-2,180.50	14,384,016.03	1,678,594.58	39.60797793	-80.86444710
10,500.00	91.00	330.00	6,724.36	791.38	-2,230.49	14,384,102.62	1,678,544.59	39.60821594	-80.86462413
10,600.00	91.00	330.00	6,722.62	877.97	-2,280.48	14,384,189.21	1,678,494.60	39.60845396	-80.86480117
10,700.00	91.00	330.00	6,720.87	964.56	-2,330.47	14,384,275.80	1,678,444.61	39.60869197	-80.86497821
10,800.00	91.00	330.00	6,719.13	1,051.15	-2,380.47	14,384,362.39	1,678,394.61	39.60892998	-80.86515525
10,900.00	91.00	330.00	6,717.38	1,137.74	-2,430.46	14,384,448.98	1,678,344.62	39.60916799	-80.86533229
11,000.00	91.00	330.00	6,715.63	1,224.33	-2,480.45	14,384,535.56	1,678,294.63	39.60940600	-80.86550934
11,100.00	91.00	330.00	6,713.89	1,310.91	-2,530.44	14,384,622.15	1,678,244.64	39.60964402	-80.86568638
11,200.00	91.00	330.00	6,712.14	1,397.50	-2,580.44	14,384,708.74	1,678,194.64	39.60988203	-80.86586343
11,300.00	91.00	330.00	6,710.40	1,484.09	-2,630.43	14,384,795.33	1,678,144.65	39.61012004	-80.86604047
11,400.00	91.00	330.00	6,708.65	1,570.68	-2,680.42	14,384,881.92	1,678,094.66	39.61035805	-80.86621752
11,500.00	91.00	330.00	6,706.91	1,657.27	-2,730.41	14,384,968.51	1,678,044.67	39.61059606	-80.86639457
11,600.00	91.00	330.00	6,705.16	1,743.86	-2,780.41	14,385,055.10	1,677,994.68	39.61083407	-80.86657162
11,700.00	91.00	330.00	6,703.42	1,830.45	-2,830.40	14,385,141.69	1,677,944.68	39.61107208	-80.86674867
11,800.00	91.00	330.00	6,701.67	1,917.04	-2,880.39	14,385,228.28	1,677,894.69	39.61131009	-80.86692572
11,900.00	91.00	330.00	6,699.93	2,003.63	-2,930.38	14,385,314.87	1,677,844.70	39.61154810	-80.86710278
12,000.00	91.00	330.00	6,698.18	2,090.22	-2,980.38	14,385,401.46	1,677,794.71	39.61178611	-80.86727983
12,100.00	91.00	330.00	6,696.44	2,176.81	-3,030.37	14,385,488.05	1,677,744.71	39.61202411	-80.86745689
12,200.00	91.00	330.00	6,694.69	2,263.40	-3,080.36	14,385,574.63	1,677,694.72	39.61226212	-80.86763395
12,300.00	91.00	330.00	6,692.95	2,349.99	-3,130.35	14,385,661.22	1,677,644.73	39.61250013	-80.86781101
12,400.00	91.00	330.00	6,691.20	2,436.58	-3,180.35	14,385,747.81	1,677,594.74	39.61273814	-80.86798807
12,500.00	91.00	330.00	6,689.46	2,523.17	-3,230.34	14,385,834.40	1,677,544.74	39.61297615	-80.86816513
12,600.00	91.00	330.00	6,687.71	2,609.76	-3,280.33	14,385,920.99	1,677,494.75	39.61321415	-80.86834219
12,700.00	91.00	330.00	6,685.97	2,696.34	-3,330.32	14,386,007.58	1,677,444.76	39.61345216	-80.86851925
12,800.00	91.00	330.00	6,684.22	2,782.93	-3,380.32	14,386,094.17	1,677,394.77	39.61369017	-80.86869632
12,900.00	91.00	330.00	6,682.48	2,869.52	-3,430.31	14,386,180.76	1,677,344.78	39.61392817	-80.86887338
13,000.00	91.00	330.00	6,680.73	2,956.11	-3,480.30	14,386,267.35	1,677,294.78	39.61416618	-80.86905045
13,100.00	91.00	330.00	6,678.98	3,042.70	-3,530.29	14,386,353.94	1,677,244.79	39.61440419	-80.86922752
13,200.00	91.00	330.00	6,677.24	3,129.29	-3,580.28	14,386,440.53	1,677,194.80	39.61464220	-80.86940459
13,300.00	91.00	330.00	6,675.49	3,215.88	-3,630.28	14,386,527.12	1,677,144.81	39.61488020	-80.86958166
13,400.00	91.00	330.00	6,673.75	3,302.47	-3,680.27	14,386,613.71	1,677,094.81	39.61511820	-80.86975873
13,500.00	91.00	330.00	6,672.00	3,389.06	-3,730.26	14,386,700.29	1,677,044.82	39.61535621	-80.86993581
13,600.00	91.00	330.00	6,670.26	3,475.65	-3,780.25	14,386,786.88	1,676,994.83	39.61559421	-80.87011288
13,700.00	91.00	330.00	6,668.51	3,562.24	-3,830.25	14,386,873.47	1,676,944.84	39.61583222	-80.87028996
13,800.00	91.00	330.00	6,666.77	3,648.83	-3,880.24	14,386,960.06	1,676,894.84	39.61607022	-80.87046703
13,900.00	91.00	330.00	6,665.02	3,735.42	-3,930.23	14,387,046.65	1,676,844.85	39.61630822	-80.87064411
14,000.00	91.00	330.00	6,663.28	3,822.01	-3,980.22	14,387,133.24	1,676,794.86	39.61654622	-80.87082119
14,100.00	91.00	330.00	6,661.53	3,908.60	-4,030.22	14,387,219.83	1,676,744.87	39.61678423	-80.87099827
14,200.00	91.00	330.00	6,659.79	3,995.18	-4,080.21	14,387,306.42	1,676,694.88	39.61702223	-80.87117535
14,300.00	91.00	330.00	6,658.04	4,081.77	-4,130.20	14,387,393.01	1,676,644.88	39.61726023	-80.87135243
14,400.00	91.00	330.00	6,656.30	4,168.36	-4,180.19	14,387,479.60	1,676,594.89	39.61749824	-80.87152952
14,500.00	91.00	330.00	6,654.55	4,254.95	-4,230.19	14,387,566.19	1,676,544.90	39.61773624	-80.87170660
14,600.00	91.00	330.00	6,652.81	4,341.54	-4,280.18	14,387,652.78	1,676,494.91	39.61797424	-80.87188369
14,700.00	91.00	330.00	6,651.06	4,428.13	-4,330.17	14,387,739.36	1,676,444.91	39.61821224	-80.87206078
14,800.00	91.00	330.00	6,649.32	4,514.72	-4,380.16	14,387,825.95	1,676,394.92	39.61845024	-80.87223787

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Planning Report - Geographic

Database:	DB_Aug0116_LT_v14	Local Co-ordinate Reference:	Well Lackawanna N-05 HM (slot BB)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1306.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1306.00ft
Site:	Lackawanna	North Reference:	Grid
Well:	Lackawanna N-05 HM (slot BB)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
14,875.38	91.00	330.00	6,648.00	4,579.99	-4,417.85	14,387,891.23	1,676,357.24	39.61862965	-80.87237136
PBHL/TD 14875.38 MD/6648.00 TVD									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target - Shape									
Lackawanna N-05HM_B - plan hits target center - Point	0.00	0.00	6,648.00	4,579.99	-4,417.85	14,387,891.23	1,676,357.24	39.61862965	-80.87237136
Lackawanna N-05HM_L - plan misses target center by 328.44ft at 7182.30ft MD (6598.59 TVD, -1993.41 N, -530.41 E) - Point	0.00	0.01	6,786.00	-2,256.56	-471.22	14,381,054.69	1,680,303.86	39.59983775	-80.85839480

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
1,800.00	1,800.00	0.00	0.00	KOP Begin 2°/100' build	
3,225.00	3,166.96	-345.84	-30.26	Begin 28.50° tangent	
5,310.80	5,000.00	-1,337.32	-117.00	Begin 3°/100' build/turn	
5,503.62	5,166.87	-1,432.29	-133.79	Begin 31.73° tangent	
6,546.27	6,053.70	-1,962.92	-271.90	Begin 10°/100' build/turn	
7,675.38	6,773.66	-1,654.44	-818.40	Begin 91.00° lateral	
14,875.38	6,648.00	4,579.99	-4,417.85	PBHL/TD 14875.38 MD/6648.00 TVD	

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Environmental Protection

WW-9
(4/16)

API Number 47 - 103 - 4710303249
Operator's Well No. Lackawanna W-5H

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Tug Hill Operating, LLC OP Code 494510851

Watershed (HUC 10) Outlet Middle Island Creek Quadrangle Porter Falls 7.5'

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes No

Will a pit be used? Yes No

If so, please describe anticipated pit waste: AST Tanks with proper containment will be used for staging fresh water for frac and flow back water

Will a synthetic liner be used in the pit? Yes No If so, what ml.? AST Tanks will be used with proper containment

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection (UIC Permit Number UIC 2459, UIC 965, UIC 359, UIC 2D0732540, UIC 2D0732523)
- Reuse (at API Number _____)
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain _____)

Will closed loop system be used? If so, describe: Yes - For Vertical and Horizontal Drilling

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air for vertical / Oil for Horizontal

-If oil based, what type? Synthetic, petroleum, etc. Synthetic Oil Base

Additives to be used in drilling medium? Barite for weight

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. All drill cuttings to be disposed of in a Landfill

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A

-Landfill or offsite name/permit number? Wetzel County Sanitary Landfill (SWF-1021 / WV0106185) and Westmoreland Sanitary Landfill, LLC (SAN1405 / PA DEP EC#1386426)

Permittee shall provide written notice to the Office of Oil and Gas of any load of drill cuttings or associated waste rejected at any West Virginia solid waste facility. The notice shall be provided within 24 hours of rejection and the permittee shall also disclose where it was properly disposed.

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature Jim Pancake
Company Official (Typed Name) Jim Pancake
Company Official Title Vice President Geoscience

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AUG 15 2018

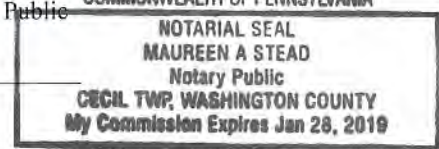
WV Department of
Environmental Protection

Subscribed and sworn before me this 7 day of AUG, 20 18

Maureen A Stead

Notary Public COMMONWEALTH OF PENNSYLVANIA

My commission expires 1/28/19



Tug Hill Operating, LLC

Proposed Revegetation Treatment: Acres Disturbed 26.69 Prevegetation pH 6.0

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20 or equivalent

Fertilizer amount 1/3 ton lbs/acre

Mulch 2.5 Tons/acre

Seed Mixtures

Temporary

Permanent

Seed Type	lbs/acre
Annual Ryegrass	40

Seed Type	lbs/acre
Fox Tail / Grassy	40
Perennial Rye	30
Crown Vetch	20

Attach:

Maps(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided). If water from the pit will be land applied, include dimensions (L x W x D) of the pit, and dimensions (L x W), and area in acreage, of the land application area.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: [Signature]

Comments: _____

Title: Oil and Gas Inspector

Date: 8-8-18

Field Reviewed? Yes No

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WW-9

MATCHLINE 2
MATCHLINE 1

4710-032149
SUPPLEMENT 32149

PROPOSED LACKAWANNA N-5HM

REFERENCE IS HEREBY MADE TO THE WV D.E.P. OFFICE OF OIL & GAS, "EROSION AND SEDIMENT CONTROL FIELD MANUAL" FOR REQUIREMENTS AND BMPs FOR AVERAGE FIELD CONDITIONS CONCERNING THE MAINTENANCE OF EXISTING ROADS AND THE CONSTRUCTION OF PROPOSED ROADS. FIELD CONDITIONS MAY REQUIRE VARIANCE FROM THESE GUIDELINES AND THE EARTHWORK CONTRACTOR IS RESPONSIBLE FOR NOTIFICATION TO THE INSPECTOR AND THE OPERATOR SHOULD THESE CONDITIONS OCCUR.

INSTALL CULVERTS AS SHOWN ON RECLAMATION PLAN OR AS FIELD CONDITIONS REQUIRE.

ENTRANCES ONTO PUBLIC ROADS SHALL BE CONSTRUCTED OR MAINTAINED IN ACCORDANCE WITH WV D.O.T. REGULATIONS. ADDITIONAL PERMITS MAY BE REQUIRED. TEMPORARILY SEED AND MULCH ALL SLOPES UPON CONSTRUCTION OF LOCATION.

ALL CUT AND FILL SLOPES ARE 2H : 1V SLOPE.

ALL TREES 6-INCHES AND ABOVE ARE TO BE CUT AND STACKED. BRUSH SLASHINGS ARE TO UTILIZED DOWN SLOPE OF SITE AND STRUCTURES TO ACT AS A CONTROL BARRIER IF AVAILABLE.

DRAWING NOT TO SCALE

TM 12 - PAR. 122
LACKAWANNA TRANS. CO.
94.5 ACRES

TM 12 - PAR. 130
LACKAWANNA TRANS. CO.
25.64 ACRES

SEDIMENT POND

EXISTING ACCESS ROAD

LANDFILL ROAD

SWAMP

OVERHEAD UTILITY

SEDIMENT POND

TRUCK WASH AREA

TM 17 - PAR. 6.3
LACKAWANNA TRANS. CO.
4.13 ACRES

POND

TM 17 - PAR. 7.1
LACKAWANNA TRANS. CO.
21.37 ACRES

TM 17 - PAR. 6
JERRY W. &
DELORES THOMPSON
30.71 ACRES

STORM SEWER POND

LANDFILL OFFICE

SEDIMENT POND

LANDFILL ROAD

TM 17 - PAR. 10.1
LACKAWANNA TRANS. CO.
13 ACRES

LEGEND

Note:

⊙ — Denotes proposed culvert with appropriate sediment outlet control (Rip Rap splash pad).

----- Silt Fence and or Sediment and Erosion Control Measure.

----- Surface Boundary

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AUG 15 2018

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Environmental Protection

SHEET 1

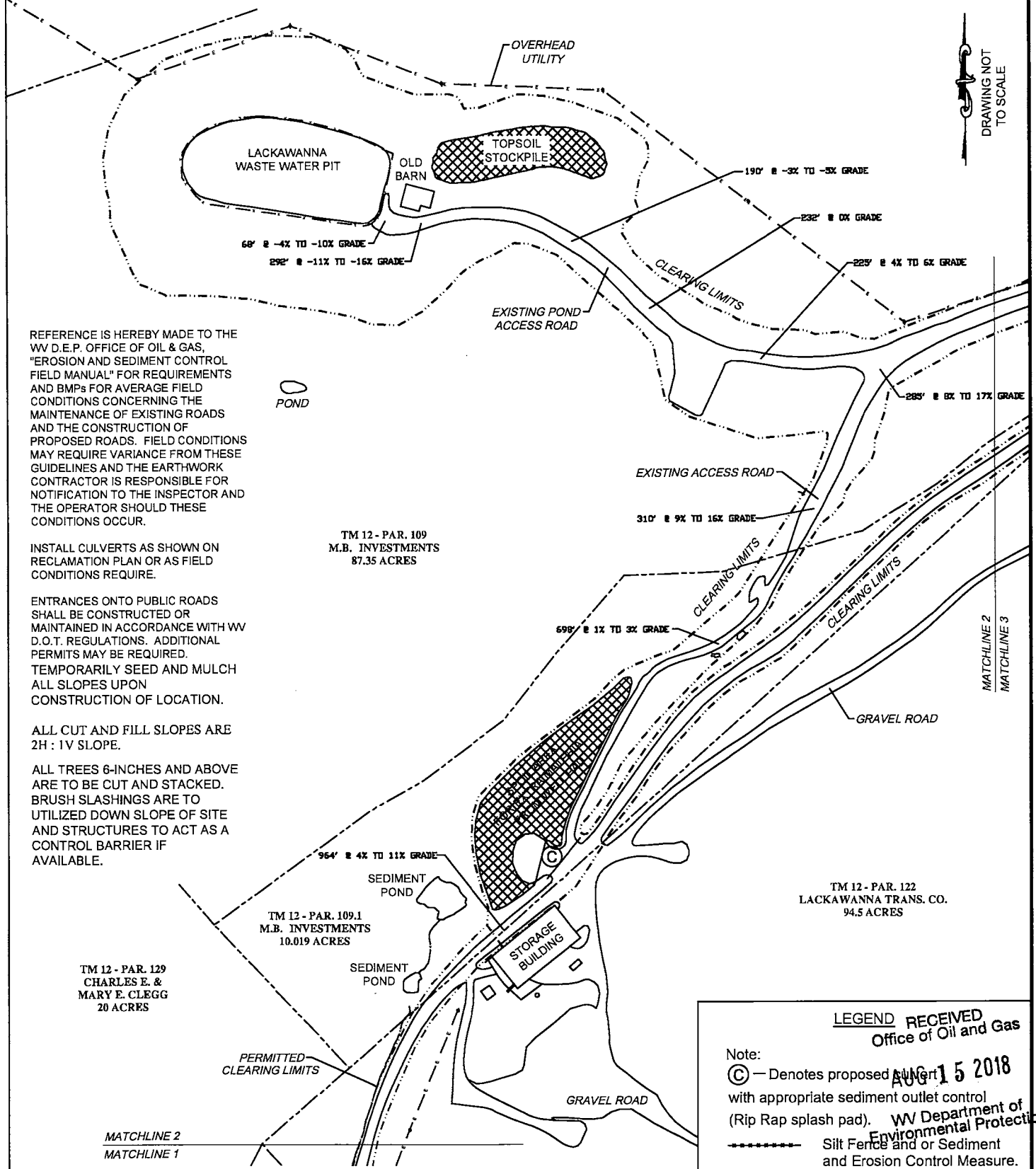
DATE: 08-01-2018

PROJECT NO: 494510851

DRAWN BY: J.A.H.

PROPOSED LACKAWANNA N-5HM

DRAWING NOT TO SCALE



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POND

TM 12 - PAR. 109
M.B. INVESTMENTS
87.35 ACRES

TM 12 - PAR. 109.1
M.B. INVESTMENTS
10.019 ACRES

TM 12 - PAR. 129
CHARLES E. &
MARY E. CLEGG
20 ACRES

TM 12 - PAR. 122
LACKAWANNA TRANS. CO.
94.5 ACRES

LEGEND RECEIVED
Office of Oil and Gas

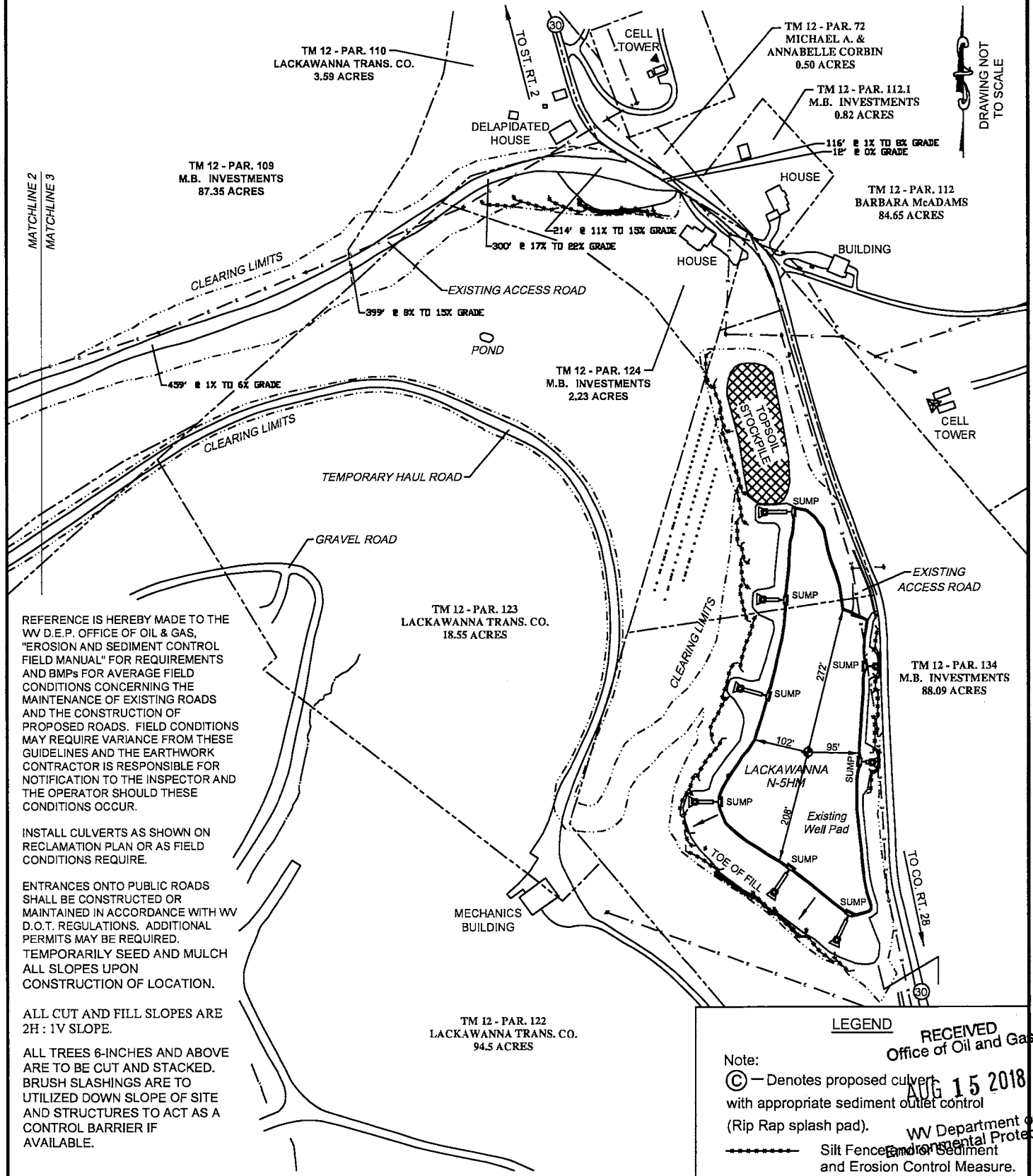
Aug 15 2018
WV Department of Environmental Protection

Note:
 (C) - Denotes proposed culvert with appropriate sediment outlet control (Rip Rap splash pad).
 - - - - - Silt Fence and or Sediment and Erosion Control Measure.
 - - - - - Surface Boundary

WW-9

PROPOSED
 LACKAWANNA N-5HM

DRAWING NOT
 TO SCALE



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ALL TREES 6-INCHES AND ABOVE ARE TO BE CUT AND STACKED. BRUSH SLASHINGS ARE TO UTILIZED DOWN SLOPE OF SITE AND STRUCTURES TO ACT AS A CONTROL BARRIER IF AVAILABLE.

TM 12 - PAR. 123
 LACKAWANNA TRANS. CO.
 18.55 ACRES

TM 12 - PAR. 122
 LACKAWANNA TRANS. CO.
 94.5 ACRES

LEGEND

Note:
 (C) — Denotes proposed culvert with appropriate sediment outlet control (Rip Rap splash pad).
 - - - - - Silt Fence and/or Sediment and Erosion Control Measure.
 ——— Surface Boundary

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4710303249



Well Site Safety Plan

Tug Hill Operating, LLC

Well Name: Lackawanna N-5HM

Pad Location: Lackawanna Pad

Wetzel County, West Virginia

UTM (meters), NAD83, Zone 17:

Northing: 4,384,042.03

Easting: 512,301.27

*DMH
8-8-18*

August 2018

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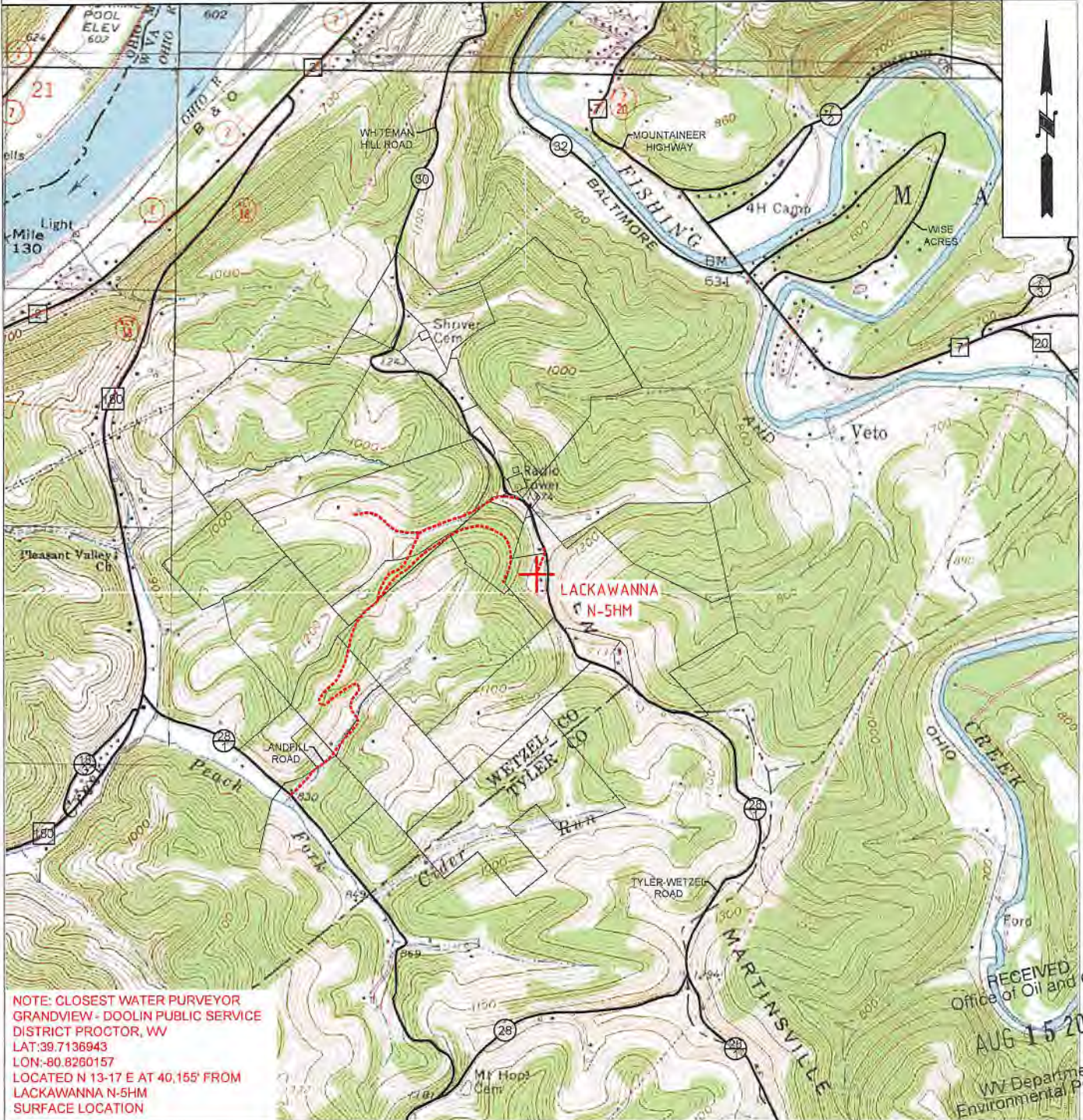
AUG 15 2018

WV Department of
Environmental Protection

WW-9

SUPPLEMENT PG 2

PROPOSED LACKAWANNA N-5HM



NOTE: CLOSEST WATER PURVEYOR
GRANDVIEW - DOOLIN PUBLIC SERVICE
DISTRICT PROCTOR, WV
LAT: 39.7136943
LON: -80.8260157
LOCATED N 13-17 E AT 40,155' FROM
LACKAWANNA N-5HM
SURFACE LOCATION

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**TUG HILL
OPERATING**

OPERATOR 494510851
TUG HILL OPERATING, LLC
380 SOUTHPOINTE BLVD
SUITE 200
CANONSBURG, PA 15317

TOPO SECTION
PORTERS FALLS 7.5'
SCALE:
1" = 2000'

LEASE NAME
LACKAWANNA
DATE:
DATE: 08-01-2018

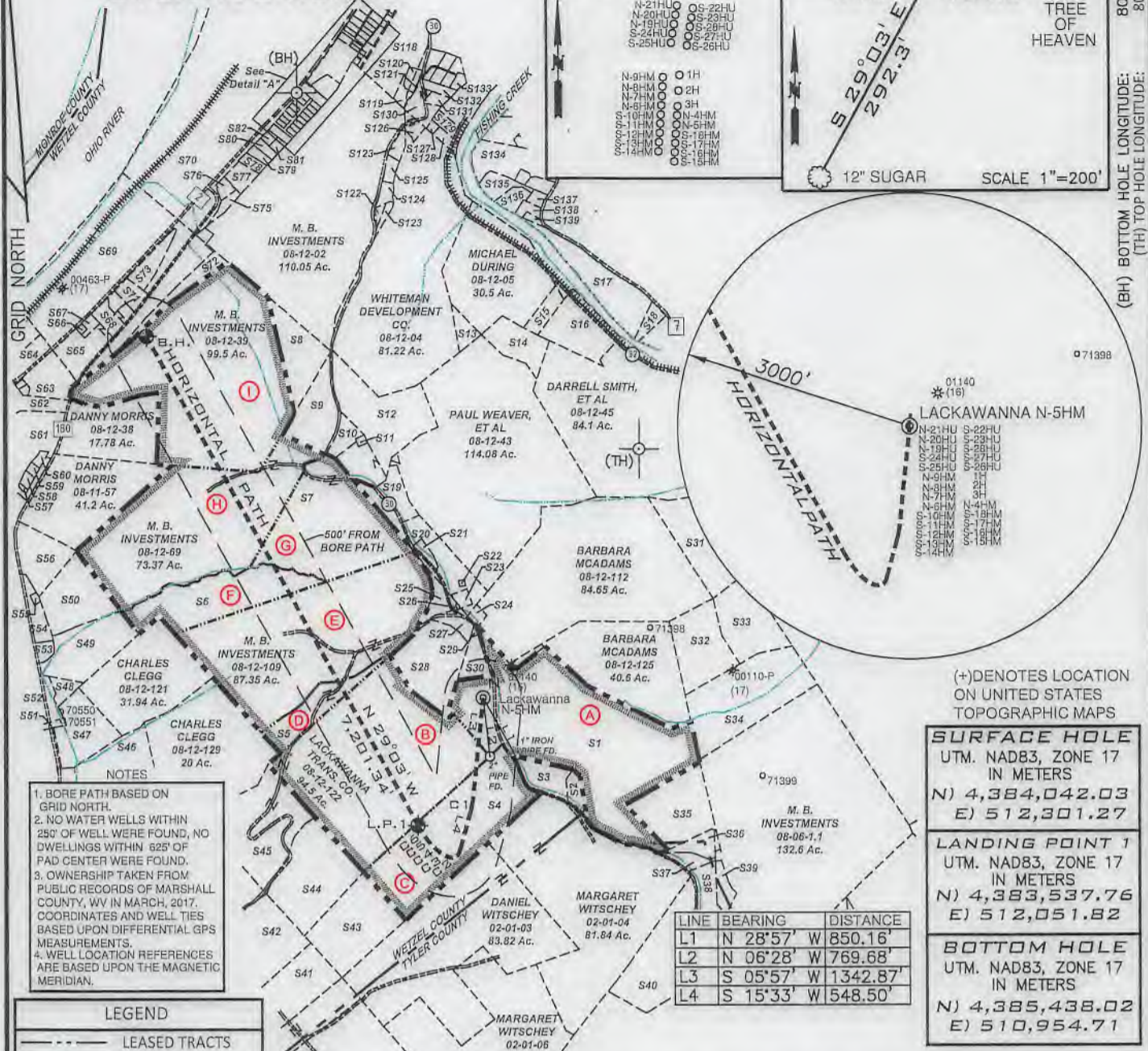
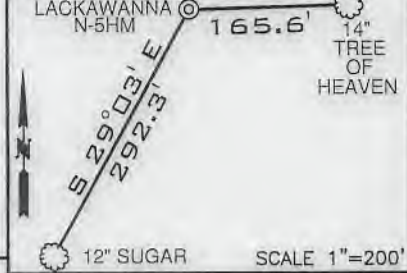
LACKAWANNA LEASE WELL N-5HM 573.949± ACRES

TOP HOLE LATITUDE: 39°37'30"
BOTTOM HOLE LATITUDE: 39°37'30"

DETAIL SCALE 1"=100'
SKETCH "A"

REFERENCES

N 88°23' E



- 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.

LEGEND

- LEASED TRACTS
- SURFACE TRACTS
- UNIT BOUNDARY
- (A) LEASE # (SEE 6A1 FORM)

(+) DENOTES LOCATION ON UNITED STATES TOPOGRAPHIC MAPS

SURFACE HOLE	
UTM. NAD83, ZONE 17	IN METERS
N) 4,384,042.03	E) 512,301.27
LANDING POINT 1	
UTM. NAD83, ZONE 17	IN METERS
N) 4,383,537.76	E) 512,051.82
BOTTOM HOLE	
UTM. NAD83, ZONE 17	IN METERS
N) 4,385,438.02	E) 510,954.71

LINE	BEARING	DISTANCE
L1	N 28°57' W	850.16'
L2	N 06°28' W	769.68'
L3	S 05°57' W	1342.87'
L4	S 15°33' W	548.50'

NUMBER	CHORD DIRECTION	CHORD LENGTH	RADIUS	ARC LENGTH	NUMBER	CHORD DIRECTION	CHORD LENGTH	RADIUS	ARC LENGTH
C1	S 10°59' W	96.48	575.26	96.59	C4	N 65°51' W	118.16	297.44	118.95
C2	S 33°20' W	89.46	125.08	91.48	C5	N 47°26' W	202.83	751.43	203.45
C3	S 81°05' W	84.25	111.39	86.40	C6	N 34°38' W	267.25	1309.93	267.72

FILE NUMBER _____

DRAWING NUMBER LACKAWANNA_WP_N-5HM

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

P.S. 708
David L Jackson



JACKSON SURVEYING INC.
P.O. Box 1460
Clarksburg, WV 26302
304-623-5851

DATE: AUGUST 2, 2018

OPERATORS WELL NO. LACKAWANNA N-5HM

API WELL NO. 47-103-03249 H6A

STATE WV COUNTY WETZEL PERMIT _____

LOCATION ELEVATION 1306.26' WATERSHED (HUC 10) OUTLET MIDDLE ISLAND CREEK

DISTRICT MAGNOLIA COUNTY WETZEL

QUADRANGLE PORTER FALL 7.5' LEASE NUMBER SEE WW-6A1 Form

SURFACE OWNER M. B. INVESTMENTS ACREAGE 88.09

OIL & GAS ROYALTY OWNER M. B. INVESTMENTS, ET AL LEASE ACREAGE 88.09

PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION

PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE (SPECIFY) _____

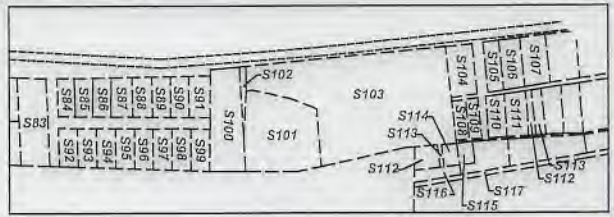
TARGET FORMATION MARCELLUS ESTIMATED DEPTH TYD 6,902' TMD: 14,875'

WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DIANNA STAMPER

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

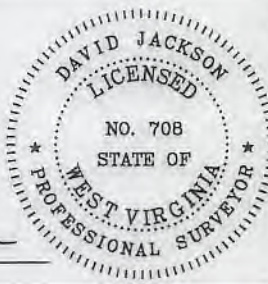
COUNTY NAME
PERMIT

**LACKAWANNA LEASE
WELL N-5HM
573.949± ACRES**



Number	TAX MAP-PARCEL	SURFACE OWNER	ACRES
S1	08-12-134	M. B. Investments	88.09
S2	08-12-134.1	Raymond L. & Elizabeth Pribble	2.14
S3	08-12-134.3	M. B. Investments	5.55
S4	08-17-04	M. B. Investments	46.75
S5	08-12-109.1	M. B. Investments	10.019
S6	08-12-108	M. B. Investments	24.0
S7	08-12-70	M. B. Investments	50.37
S8	08-12-14	Thomas & Helena McLaughlin	10.5
S9	08-12-40	Timothy Doty & Helena McLaughlin	8.83
S10	08-12-41	Michael A. & Annabelle Corbin & Paul E. & Christine Weaver	3.39
S11	08-12-42	Shriver Cemetery	1.0
S12	08-12-43.1	Michael A. & Annabelle Corbin & Paul E. & Christine Weaver	22.25
S13	08-12-15	Michael A. & Annabelle Corbin & Paul E. & Christine Weaver	2.6
S14	08-12-44	Richard L. Armstrong, et al	8.0
S15	08-12-5.1	Michael & Joyce Durig	4.0
S16	08-12-16	Russell Dalrymple, et al	11.87
S17	08-12-08	Calvin Dean Cross	14.96
S18	08-12-17	Virgie E. Kuhns	1.25
S19	08-12-43.2	Michael A. & Annabelle Corbin & Paul E. & Christine Weaver	7.25
S20	08-12-43.5	M. B. Investments	8.774
S21	08-12-43.4	M. B. Investments	0.996
S22	08-12-43.3	Geraldine C. Cross	0.13
S23	08-12-111	WV Conservation Comm.	1.0
S24	08-12-112.1	M. B. Investments	0.82
S25	08-12-110	Lackawanna Transport Company	3.59
S26	08-12-72	Michael A. & Annabelle Corbin & Paul E. & Christine Weaver	0.50
S27	08-12-124	M. B. Investments	2.23
S28	08-12-123	Lackawanna Transport Company	18.55
S29	08-12-134.2	M. B. Investments	0.23
S30	08-12-134.4	M. B. Investments	3.51
S31	08-12-113	Jacob Presley Morgan III	16.30
S32	08-12-126	Jacob Presley Morgan III	16.06
S33	08-12-127	Jacob Presley Morgan III	10.0
S34	08-12-136	Jacob Presley Morgan III	28.25
S35	08-12-135	Timothy J. Haynes & Gary W. Wofter	21.0
S36	02-01-5.2	Mark K. & Teresa J. Loy	2.945
S37	02-01-5.3	Mark K. & Teresa J. Loy	1.939
S38	02-01-5.1	Mark K. & Teresa J. Loy	4.56
S39	05-06-01	Mark K. & Teresa J. Loy	2.37
S40	02-01-05	Daniel A. Witschey	21.5
S41	08-17-14	Sharon Manion	16.12
S42	08-17-10.1	Lackawanna Transport Company	13.0
S43	08-17-07	Daniel A. Witschey	21.375
S44	08-17-7.1	Lackawanna Transport Company	21.37
S45	08-12-130	Lackawanna Transport Company	25.64
S46	08-17-02	M. B. Investments	74.0
S47	08-12-120	Charles E. & Mary E. Clegg	12.61
S48	08-11-82	Mary Elizabeth Clegg	3.24
S49	08-12-106	Thomas C. Pennell	15.96
S50	08-12-106.1	Thomas R. & Tamera D. Pennell	14.04
S51	08-11-82.1	Pleasant Valley Church of Christ	0.77
S52	08-11-81	Timothy M. Clegg	0.75
S53	08-11-79	Floyd E. Lewis, Jr. & Floyd E. Lewis, Sr.	0.67
S54	08-11-73.2	Floyd E. Lewis, Jr. & Floyd E. Lewis, Sr.	3.88
S55	08-11-74	Vada Hart Est., et al	0.31
S56	08-11-61	Hunter B. McAdams & Doug McAdams	7.61
S57	08-11-57.2	Erick L. & Jessica Kibbey	28.51
S58	08-11-57.4	Ralph & Velinda Phillips	0.61
S59	08-11-57.1	Ralph & Velinda Phillips	0.48
S60	08-11-57.3	Martha L. Graham	1.8
S61	08-11-42	Martha L. Graham	5.0
S62	08-11-39.1	William L. & Beulah Talkington	1.83
S63	08-11-41	A+A Supply, LLC	1.63
S64	08-11-35	Lisa Straight & Edwin Rial	5.9
S65	08-12-11	Calvin T. Hedrick	6.64
S66	08-12-11.1	Larry D. McCaman	0.23

Number	TAX MAP-PARCEL	SURFACE OWNER	ACRES
S67	08-12-11.3	Larry McCaman	0.807
S68	08-12-11.4	Paul Andrew James Simmons, Jr.	1.94
S69	08-12-01	Mount Clare Properties, Inc	50.71
S70	08-07-105	Mount Clare Properties, Inc	105.08
S71	08-12-11.2	Ascent Resources Marcellus Minerals, LLC	1.811
S72	08-12-13	M. B. Investments	8.18
S73	08-12-139	Department of Public Safety	3.86
S75	08-07-87.2	H. Lee Scott Jr.	1.110
S76	08-07-87.1	H. Lee Scott Jr.	0.955
S77	08-07-87	H. Lee Scott Jr. & Colleen D., Stephen A. & Betty A. Davis	2.221
S78	08-07-88	Living Quarters, LLC	1.08
S79	08-07-89.3	Living Quarters, LLC	0.87
S80	08-07-89.2	Barbara S. Nice	0.89
S81	08-07-89	Barbara S. Nice	0.40
S82	08-07-89.1	Barbara S. Nice	0.35
S83	08-07-90	Barbara Shank	0.69
S84	08-07-91	Dennis Phillips	0.20
S85	08-07-92	Karen D. Pugh	0.20
S86	08-07-93	Darrell S. & Diana Lynn Hartwig	0.21
S87	08-07-94	Ronald D. & Carole Dawson	0.21
S88	08-07-95	Debra Barrile	0.21
S89	08-07-96	Rita E. Barrick	0.21
S90	08-07-102	Michael Vaughn Skeen & Patricia Ann Sawyer	0.22
S91	08-07-103.1	Charlotte M. Adams	0.22
S92	08-07-97	Ray H. Booher	0.20
S93	08-07-98	Ray H. Booher	0.20
S94	08-07-98.1	Lionel Kent, Helen A. Potts & Deloris Potts (Life)	0.20
S95	08-07-99	Lionel Kent, Helen A. Potts & Deloris Potts (Life)	0.20
S96	08-07-100	James J. & Carol Clark	0.21
S97	08-07-101	Doris A. Fannin & Richard S. Williamson	0.21
S98	08-07-102.1	Ronald E. Jr. & Lori J. McCoy	0.21
S99	08-07-103	Michael L. & Joyce D. Durig	0.21
S100	08-07-104	Lisa Denise Bridge	0.12
S101	08-07-106.1	Tiona Henthorn	1.49
S102	08-07-104.1	Lisa Denise Bridge	0.06
S103	08-07-106	Route 2 South, LLC	4.33
S104	08-07-107	Route 2 South, LLC	0.36
S105	08-07-108	Donald W. Owens, Jr.	0.21
S106	08-07-109	Douglas E. & Amber L. Straight	0.21
S107	08-07-110	Allen R. & Malinda J. Laugh	0.34
S108	08-07-114	Ruth Leek	0.14
S109	08-07-115	William J. Leek	0.14
S110	08-07-116	Betty J. Yaho (Life), Sandra M. Hardman	0.20
S111	08-07-117	Jerry W. & Elizabeth Southerly	0.21
S112	08-07-123.1	Ruth Ann Leek	0.23
S113	08-07-123.2	Ruth Ann Leek	0.07
S114	08-07-124	Ruth Ann Leek	0.08
S115	08-07-125	Ruth Ann Leek	0.07
S116	08-07-126	Ruth Ann Leek	0.30
S117	08-07-129	John William Burton, et al	1.10
S118	08-07-131.3	Nancy J. Todd	9.726
S119	08-07-131.1	Edgar W. Whiteman, Jr.	1.25
S120	08-07-131.4	Nancy J. Todd	0.989
S121	08-07-137.4	Nancy J. Todd	0.06
S122	08-12-03	O. Terrell Coffield Family Trust	0.98
S123	08-12-4.1	Whiteman Development Co., LLC & PRN, LLC	2.59
S124	08-07-142	Pamela E. Weisenbarger	1.35
S125	08-07-142.1	Thomas W, II & Teena B. Emch	1.35
S126	08-07-160	Frank L. Price, Jr.	1.28
S127	08-07-144	Bennie D. Lewis, et al	5.58
S128	08-07-143	Dominic D. Yost	1.0
S129	08-07-144.1	Donald J. & Debby J. Powell	2.25
S130	08-07-137	462 Properties, LLC	1.836
S131	08-07-137.2	Steven D. Folmar	1.0
S132	08-07-138	Frederick W. & Leslie M. Emch	1.11
S133	08-07-137.1	Steven D. Folmar	0.94
S134	08-07-145	Lois J. Day	8.008
S135	08-07-145.5	Jodi Forni	3.85
S136	08-07-145.3	Jodi Forni	2.641
S137	08-07-145.2	David J. Jackson,(Life), James & Ruth Jackson	0.813
S138	08-12-06	David J. Jackson,(Life), James & Ruth Jackson	1.74
S139	08-12-07	David J. Jackson,(Life), James & Ruth Jackson	0.35



P.S. 708 *David L Jackson*

OPERATOR'S WELL #1 LACKAWANNA N-5HM
 DISTRICT: Magnolia
 COUNTY: Wetzel
 STATE: WV

WELL PLAT
 PAGE 2 OF 2
 DATE: 08/02/2018

WW-6A1
(5/13)

Operator's Well No. Lackawanna N-5HM

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

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

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

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

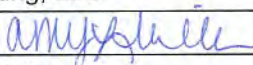
*See attached pages

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

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

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

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

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

WW-6A1 Supplement

Operator's Well No. Lackawanna N - 5HM

Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page		Assignment
10*47103.061.2	8-12-134	A	M B INVESTMENTS	TH EXPLORATION LLC	1/8+	179A	475	N/A
10*47103.060.5	8-12-122	B	LACKAWANNA TRANSPORT COMPANY	TH EXPLORATION LLC	1/8+	179A	462	N/A
10*47103.060.6	8-12-122	B	WILLIAM JOSEPH GAMBLE AND LINDA ELAINE GAMBLE	TH EXPLORATION LLC	1/8+	179A	466	N/A
10*47103.060.7	8-12-122	B	JOHN BRENT GAMBLE	TH EXPLORATION LLC	1/8+	179A	469	N/A
10*47103.060.8	8-12-122	B	JANE ANN GAMBLE	TH EXPLORATION LLC	1/8+	179A	472	N/A
10*47103.061.2	8-17-4	C	M B INVESTMENTS	TH EXPLORATION LLC	1/8+	179A	475	N/A
10*47103.061.2	8-12-109.1	D	M B INVESTMENTS	TH EXPLORATION LLC	1/8+	179A	475	N/A
10*47103.061.2	8-12-109	E	M B INVESTMENTS	TH EXPLORATION LLC	1/8+	179A	475	N/A
10*47103.061.2	8-12-108	F	M B INVESTMENTS	TH EXPLORATION LLC	1/8+	179A	475	N/A
10*47103.061.2	8-12-70	G	M B INVESTMENTS	TH EXPLORATION LLC	1/8+	179A	475	N/A
10*47103.061.2	8-12-69	H	M B INVESTMENTS	TH EXPLORATION LLC	1/8+	179A	475	N/A
10*47103.061.2	8-12-39	I	M B INVESTMENTS	TH EXPLORATION LLC	1/8+	179A	475	N/A

AFFIDAVIT

COPY 4710 03249

STATE OF TEXAS §
§ SS
COUNTY OF TARRANT §

On this 18th day of October, 2016, before me, the undersigned authority, personally appeared David D. Kalish ("Affiant") who being first duly sworn under oath, deposes and saith:

- 1. TH Exploration, LLC, TH Exploration II, LLC and TH Exploration III, LLC are wholly owned subsidiaries of THQ Appalachia I, LLC.
2. Tug Hill Operating, LLC provides oil and gas operations services to THQ Appalachia I, LLC under an Operating Services Agreement dated July 23, 2014.
3. David D. Kalish, the Affiant, is the Vice President of Tug Hill Operating, LLC, THQ Appalachia I, LLC, TH Exploration, LLC, TH Exploration II, LLC and TH Exploration III, LLC, and;
3. Tug Hill Operating, LLC is authorized to operate and maintain the assets owned by THQ Appalachia I, LLC, including, as referenced above, TH Exploration, LLC, TH Exploration II, LLC, and TH Exploration III, LLC, including oil and gas leases, wells, pipelines, surface facilities, and other all other assets that support the business of THQ Appalachia I, LLC, and;
4. Specifically, Tug Hill Operating, LLC is authorized to submit and obtain well work permits and carry out all activities pursuant to such work permits for assets owned by TH Exploration, LLC, TH Exploration II, LLC, TH Exploration III, LLC.

FURTHER, AFFIANT SAITH NOT.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this 18th day of October, 2016.

David D. Kalish
Affiant: David D. Kalish

JURAT

Jan Pest
MARSHALL County 03:44:28 PM
Instrument No 1416299
Date Recorded 10/19/2016
Document Type HIS
Pages Recorded 1
Book-Page 28-62
Recording Fee \$5.00
Additional \$6.00

RECEIVED
Office of Oil and Gas
AUG 15 2018

STATE OF TEXAS §
§ SS
COUNTY OF TARRANT §

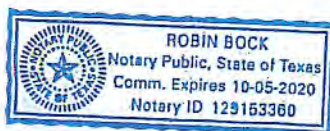
Sworn and subscribed to (or affirmed) before me on this, the 18th day of October, 2016, by David D. Kalish

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

My Commission Expires: 10-05-2020

Signature/Notary Public: Robin Bock

Name/Notary Public (Print): Robin Bock



WHEN RECORDED RETURN TO:
TH Exploration II, LLC
1320 South University Drive, Suite 500
Fort Worth, Texas 76107
Attn: David Kalish

Execution Version

ASSIGNMENT AND BILL OF SALE

STATE OF WV §
 § KNOW ALL MEN BY THESE PRESENTS:
COUNTY OF WETZEL §

THIS ASSIGNMENT AND BILL OF SALE (this "*Assignment*"), dated April 7, 2016, but effective as of 7:00 A.M. Houston time on January 1, 2016 (the "*Effective Time*"), is between Gstar Exploration Inc., a Delaware corporation, whose address is 1331 Lamar Street, Suite 650 Houston, Texas 77010 ("*Assignor*"), and TH Exploration II, LLC, a Texas limited liability company, whose address is 1320 South University Drive, Suite 500, Fort Worth, Texas 76107 ("*Assignee*"). Assignor and Assignee are each, individually, referred to herein as a "*Party*" and, collectively, as the "*Parties*".

Capitalized terms used but not defined herein shall have the respective meanings set forth in that certain Purchase and Sale Agreement (the "*Purchase Agreement*"), dated as of February 19, 2016, by and between Assignor and Assignee (as successor-in-interest).

Section 1. Assignment. The conveyance and assignment herein shall be deemed effective as of the Effective Time.

For Ten Dollars (\$10.00) and other good and valuable consideration (the receipt and sufficiency of which are hereby acknowledged), Assignor does hereby forever GRANT, BARGAIN, SELL, CONVEY, ASSIGN, TRANSFER, SET OVER AND DELIVER unto Assignee, all of Assignor's right, title and interest in and to the following interests and properties (such right, title and interest described in *subsections (a) through (k)* of this Section 1, less and except the Excluded Assets, collectively, the "*Conveyed Interests*");

(a) all oil, gas and/or mineral leases of Assignor, together with any and all other right, title and interest of Assignor in and to the leasehold estates created thereby, including subleases, royalties, overriding royalties, net profits interest, carried interests or similar rights or interests in such leases, and together with all rights, privileges, benefits and powers conferred upon Assignor with respect to the use and occupation of the lands covered thereby that may be necessary, convenient or incidental to the possession and enjoyment of such leases, located in Marshall, Wetzel, Doddridge, Harrison, Lewis, Marion, and Monongalia Counties, West Virginia and Greene, Butler, Fayette, Somerset, and Clearfield Counties, Pennsylvania, including those described on Exhibit A—Part 1 attached hereto (subject to any reservations, limitations or depth restrictions described on Exhibit A—Part 1), (Assignor's interest in such leases and other right, title and interest as so limited, the "*Leases*");

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Office of Oil and Gas

AUG 15 2018

WV Department of
Environmental Protection



August 14, 2018

WV Department of Environmental Protection
Office of Oil & Gas
601 57th Street, SE
Charleston, WV 25304
Attention: Laura Adkins

RE: Lackawanna N-5HM

Dear Laura:

Tug Hill Operating, LLC (THO) hereby submits this letter as confirmation that THO has obtained the right to drill, extract and produce the minerals under Wetzel County Route 30 in the area reflected on the Lackawanna 2H well plat. THO has conducted a full title search in the relevant Court House to confirm its' ownership under said County Routes and is not currently aware of any recorded document that would suggest an ownership other than THO.

If your office has any questions or concerns regarding the contents of this letter, please do not hesitate to contact me at 304-376-0111 or by email at amiller@tug-hilop.com.

Sincerely,

A handwritten signature in blue ink that reads "Amy L. Miller".

Amy L. Miller

Permit Specialist – Appalachia

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Office of Oil and Gas
AUG 15 2018
WV Department of
Environmental Protection

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE CERTIFICATION

Date of Notice Certification: 08/13/2018

API No. 47- 103 - _____

Operator's Well No. Lackawanna N-5HM

Well Pad Name: Lackawanna

Notice has been given:

Pursuant to the provisions in West Virginia Code § 22-6A, the Operator has provided the required parties with the Notice Forms listed below for the tract of land as follows:

State:	<u>West Virginia</u>	UTM NAD 83	Easting:	<u>512,301.27</u>
County:	<u>Wetzel</u>		Northing:	<u>4,384,042.03</u>
District:	<u>Magnolia</u>	Public Road Access:	<u>County Route 30</u>	
Quadrangle:	<u>Porter Falls</u>	Generally used farm name:	<u>Wetzel County Sanitary Landfill</u>	
Watershed:	<u>Outlet Middle Island Creek</u>			

Pursuant to West Virginia Code § 22-6A-7(b), every permit application filed under this section shall be on a form as may be prescribed by the secretary, shall be verified and shall contain the following information: (14) A certification from the operator that (i) it has provided the owners of the surface described in subdivisions (1), (2) and (4), subsection (b), section ten of this article, the information required by subsections (b) and (c), section sixteen of this article; (ii) that the requirement was deemed satisfied as a result of giving the surface owner notice of entry to survey pursuant to subsection (a), section ten of this article six-a; or (iii) the notice requirements of subsection (b), section sixteen of this article were waived in writing by the surface owner; and Pursuant to West Virginia Code § 22-6A-11(b), the applicant shall tender proof of and certify to the secretary that the notice requirements of section ten of this article have been completed by the applicant.

Pursuant to West Virginia Code § 22-6A, the Operator has attached proof to this Notice Certification that the Operator has properly served the required parties with the following:

*PLEASE CHECK ALL THAT APPLY

1. NOTICE OF SEISMIC ACTIVITY or NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED

2. NOTICE OF ENTRY FOR PLAT SURVEY or NO PLAT SURVEY WAS CONDUCTED

3. NOTICE OF INTENT TO DRILL or NOTICE NOT REQUIRED BECAUSE NOTICE OF ENTRY FOR PLAT SURVEY WAS CONDUCTED or

WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)

4. NOTICE OF PLANNED OPERATION

5. PUBLIC NOTICE

6. NOTICE OF APPLICATION

OOG OFFICE USE ONLY

RECEIVED/ NOT REQUIRED

RECEIVED

RECEIVED/ NOT REQUIRED

RECEIVED

RECEIVED

RECEIVED

RECEIVED

RECEIVED
Office of Oil and Gas
AUG 15 2018

Required Attachments:

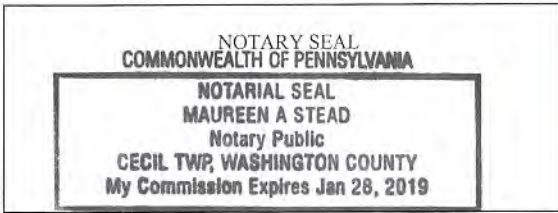
The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication date verification or the associated Affidavit of Publication. The attached Notice Forms and Certifications of Notice shall serve as proof that the required parties have been noticed as required under West Virginia Code § 22-6A. Pursuant to West Virginia Code § 22-6A-11(b), the Certification of Notice to the person may be made by affidavit of personal service, the return receipt card or other postal receipt for certified mailing.

WV Department of Environmental Protection

Certification of Notice is hereby given:

THEREFORE, I Amy L. Miller, have read and understand the notice requirements within West Virginia Code § 22-6A. I certify that as required under West Virginia Code § 22-6A, I have served the attached copies of the Notice Forms, identified above, to the required parties through personal service, by registered mail or by any method of delivery that requires a receipt or signature confirmation. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this Notice Certification and all attachments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Well Operator:	<u>Tug Hill Operating, LLC</u>	Address:	<u>380 Southpointe Boulevard, Plaza II, Suite 200</u>
By:	<u>Amy L. Miller <i>Amy Miller</i></u>		<u>Canonsburg, PA 15317</u>
Its:	<u>Permit Specialist</u>	Facsimile:	<u>724-338-2030</u>
Telephone:	<u>724-749-8388</u>	Email:	<u>amiller@tug-hillop.com</u>



Subscribed and sworn before me this 13 day of AUG. 2018.
Maureen A Stead Notary Public
 My Commission Expires 1/28/19

Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at deprivacyofficer@wv.gov.

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Office of Oil and Gas
AUG 15 2018
WV Department of
Environmental Protection

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF APPLICATION

Notice Time Requirement: notice shall be provided no later than the **filing date of permit application.**

Date of Notice: 8/9/2018 **Date Permit Application Filed:** 8/10/2018

Notice of:

- PERMIT FOR ANY WELL WORK
- CERTIFICATE OF APPROVAL FOR THE CONSTRUCTION OF AN IMPOUNDMENT OR PIT

Delivery method pursuant to West Virginia Code § 22-6A-10(b)

- PERSONAL SERVICE
- REGISTERED MAIL
- METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to W. Va. Code § 22-6A-10(b) no later than the filing date of the application, the applicant for a permit for any well work or for a certificate of approval for the construction of an impoundment or pit as required by this article shall deliver, by personal service or by registered mail or by any method of delivery that requires a receipt or signature confirmation, copies of the application, the erosion and sediment control plan required by section seven of this article, and the well plat to each of the following persons: (1) The owners of record of the surface of the tract on which the well is or is proposed to be located; (2) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for roads or other land disturbance as described in the erosion and sediment control plan submitted pursuant to subsection (c), section seven of this article; (3) The coal owner, operator or lessee, in the event the tract of land on which the well proposed to be drilled is located [sic] is known to be underlain by one or more coal seams; (4) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for the placement, construction, enlargement, alteration, repair, removal or abandonment of any impoundment or pit as described in section nine of this article; (5) Any surface owner or water purveyor who is known to the applicant to have a water well, spring or water supply source located within one thousand five hundred feet of the center of the well pad which is used to provide water for consumption by humans or domestic animals; and (6) The operator of any natural gas storage field within which the proposed well work activity is to take place. (c)(1) If more than three tenants in common or other co-owners of interests described in subsection (b) of this section hold interests in the lands, the applicant may serve the documents required upon the person described in the records of the sheriff required to be maintained pursuant to section eight, article one, chapter eleven-a of this code. (2) Notwithstanding any provision of this article to the contrary, notice to a lien holder is not notice to a landowner, unless the lien holder is the landowner. W. Va. Code R. § 35-8-5.7.a requires, in part, that the operator shall also provide the Well Site Safety Plan ("WSSP") to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Application Notice WSSP Notice E&S Plan Notice Well Plat Notice is hereby provided to:

SURFACE OWNER(s)

Name: M.B. Investments
 Address: 2650 Audubon Road
Audubon, PA 19493
 Name: _____
 Address: _____

SURFACE OWNER(s) (Road and/or Other Disturbance)

Name: Lackawanna Transport Company
 Address: 2650 Audubon Road
Audubon, PA 19493
 Name: _____
 Address: _____

SURFACE OWNER(s) (Impoundments or Pits)

Name: _____
 Address: _____

COAL OWNER OR LESSEE

Name: M.B. Investments
 Address: 2650 Audubon Road
Audubon, PA 19493
 COAL OPERATOR
 Name: _____
 Address: _____

SURFACE OWNER OF WATER WELL AND/OR WATER PURVEYOR(s)

Name: *See attachment
 Address: _____

OPERATOR OF ANY NATURAL GAS STORAGE FIELD

Name: _____
 Address: _____

*Please attach additional forms if necessary

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Office of Oil and Gas

AUG 15 2018

WV Department of
Environmental Protection

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-10(b), notice is hereby given that the undersigned well operator has applied for a permit for well work or for a certificate of approval for the construction of an impoundment or pit.

This Notice Shall Include:

Pursuant to W. Va. Code § 22-6A-10(b), this notice shall include: (1) copies of the application; (2) the erosion and sediment control plan required by section seven of this article; and (3) the well plat.

Pursuant to W. Va. Code § 22-6A-10(f), this notice shall include: (1) a statement of the time limits for filing written comments; (2) who may file written comments; (3) the name and address of the secretary for the purpose of filing the comments and obtaining additional information; and (4) a statement that the persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

Pursuant to W. Va. Code R. § 35-8-5.7.a, the operator shall provide the Well Site Safety Plan to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Pursuant to W. Va. Code R. § 35-8-15.2.c, this notice shall: (1) contain a statement of the surface owner's and water purveyor's right to request sampling and analysis; (2) advise the surface owner and water purveyor of the rebuttable presumption for contamination or deprivation of a fresh water source or supply; advise the surface owner and water purveyor that refusal to allow the operator to conduct a pre-drilling water well test constitutes a method to rebut the presumption of liability; (3) advise the surface owner and water purveyor of his or her independent right to sample and analyze any water supply at his or her own expense; advise the surface owner and water purveyor whether or not the operator will utilize an independent laboratory to analyze any sample; and (4) advise the surface owner and or water purveyor that he or she can obtain from the Chief a list of water testing laboratories in the subject area capable of and qualified to test water supplies in accordance with standard acceptable methods.

Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

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Well Location Restrictions

Pursuant to W. Va. Code § 22-6A-12, Wells may not be drilled within two hundred fifty feet measured horizontally from any existing water well or developed spring used for human or domestic animal consumption. The center of well pads may not be located within one hundred twenty-five feet of an occupied dwelling structure, or a building two thousand five hundred square feet or larger used to house or shelter dairy cattle or poultry husbandry. This limitation is applicable to those wells, developed springs, dwellings or agricultural buildings that existed on the date a notice to the surface owner of planned entry for surveying or staking as provided in section ten of this article or a notice of intent to drill a horizontal well as provided in subsection (b), section sixteen of this article was provided, whichever occurs first, and to any dwelling under construction prior to that date. This limitation may be waived by written consent of the surface owner transmitted to the department and recorded in the real property records maintained by the clerk of the county commission for the county in which such property is located. Furthermore, the well operator may be granted a variance by the secretary from these distance restrictions upon submission of a plan which identifies the sufficient measures, facilities or practices to be employed during well site construction, drilling and operations. The variance, if granted, shall include terms and conditions the department requires to ensure the safety and protection of affected persons and property. The terms and conditions may include insurance, bonding and indemnification, as well as technical requirements. (b) No well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream, natural or artificial lake, pond or reservoir, or a wetland, or within three hundred feet of a naturally reproducing trout stream. No well pad may be located within one thousand feet of a surface or ground water intake of a public water supply. The distance from the public water supply as identified by the department shall be measured as follows: (1) For a surface water intake on a lake or reservoir, the distance shall be measured from the boundary of the lake or reservoir. (2) For a surface water intake on a flowing stream, the distance shall be measured from a semicircular radius extending upstream of the surface water intake. (3) For a groundwater source, the distance shall be measured from the wellhead or spring. The department may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. A waiver, if granted, shall impose any permit conditions as the secretary considers necessary. (c) Notwithstanding the foregoing provisions of this section, nothing contained in this section prevents an operator from conducting the activities permitted or authorized by a Clean Water Act Section 404 permit or other approval from the United States Army Corps of Engineers within any waters of the state or within the restricted areas referenced in this section. (d) The well location restrictions set forth in this section shall not apply to any well on a multiple well pad if at least one of the wells was permitted prior to the effective date of this article. (e) The secretary shall, by December 31, 2012, report to the Legislature on the noise, light, dust and volatile organic compounds generated by the drilling of horizontal wells as they relate to the well location restrictions regarding occupied dwelling structures pursuant to this section. Upon a finding, if any, by the secretary that the well location restrictions regarding occupied dwelling structures are inadequate or otherwise require alteration to address the items

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WV Department of
Environmental Protection

WW-6A
(8-13)

API NO. 47-¹⁰³**4710303249**
OPERATOR WELL NO. Lackawanna N-5111
Well Pad Name: Lackawanna

examined in the study required by this subsection, the secretary shall have the authority to propose for promulgation legislative rules establishing guidelines and procedures regarding reasonable levels of noise, light, dust and volatile organic compounds relating to drilling horizontal wells, including reasonable means of mitigating such factors, if necessary.

Water Well Testing:

Pursuant to West Virginia Code § 22-6A-10(d), notification shall be made, with respect to surface landowners identified in subsection (b) or water purveyors identified in subdivision (5), subsection (b) of this section, of the opportunity for testing their water well. The operator shall provide an analysis to such surface landowner or water purveyor at their request.

Water Testing Laboratories:

Pursuant to West Virginia Code § 22-6A-10(i), persons entitled to notice pursuant to subsection (b) of this section may contact the department to ascertain the names and locations of water testing laboratories in the subject area capable and qualified to test water supplies in accordance with standard accepted methods. In compiling that list of names the department shall consult with the state Bureau for Public Health and local health departments. A surface owner and water purveyor has an independent right to sample and analyze any water supply at his or her own expense. The laboratory utilized by the operator shall be approved by the agency as being certified and capable of performing sample analyses in accordance with this section.

Rebuttable Presumption for Contamination or Deprivation of a Fresh Water Source or Supply:

W. Va. Code § 22-6A-18 requires that (b) unless rebutted by one of the defenses established in subsection (c) of this section, in any action for contamination or deprivation of a fresh water source or supply within one thousand five hundred feet of the center of the well pad for horizontal well, there is a rebuttable presumption that the drilling and the oil or gas well or either was the proximate cause of the contamination or deprivation of the fresh water source or supply. (c) In order to rebut the presumption of liability established in subsection (b) of this section, the operator must prove by a preponderance of the evidence one of the following defenses: (1) The pollution existed prior to the drilling or alteration activity as determined by a predrilling or prealteration water well test. (2) The landowner or water purveyor refused to allow the operator access to the property to conduct a predrilling or prealteration water well test. (3) The water supply is not within one thousand five hundred feet of the well. (4) The pollution occurred more than six months after completion of drilling or alteration activities. (5) The pollution occurred as the result of some cause other than the drilling or alteration activity. (d) Any operator electing to preserve its defenses under subdivision (1), subsection (c) of this section shall retain the services of an independent certified laboratory to conduct the predrilling or prealteration water well test. A copy of the results of the test shall be submitted to the department and the surface owner or water purveyor in a manner prescribed by the secretary. (e) Any operator shall replace the water supply of an owner of interest in real property who obtains all or part of that owner's supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source with a comparable water supply where the secretary determines that the water supply has been affected by contamination, diminution or interruption proximately caused by the oil or gas operation, unless waived in writing by that owner. (f) The secretary may order the operator conducting the oil or gas operation to: (1) Provide an emergency drinking water supply within twenty-four hours; (2) Provide temporary water supply within seventy-two hours; (3) Within thirty days begin activities to establish a permanent water supply or submit a proposal to the secretary outlining the measures and timetables to be used in establishing a permanent supply. The total time in providing a permanent water supply may not exceed two years. If the operator demonstrates that providing a permanent replacement water supply cannot be completed within two years, the secretary may extend the time frame on case-by-case basis; and (4) Pay all reasonable costs incurred by the real property owner in securing a water supply. (g) A person as described in subsection (b) of this section aggrieved under the provisions of subsections (b), (e) or (f) of this section may seek relief in court... (i) Notwithstanding the denial of the operator of responsibility for the damage to the real property owner's water supply or the status of any appeal on determination of liability for the damage to the real property owner's water supply, the operator may not discontinue providing the required water service until authorized to do so by the secretary or a court of competent jurisdiction.

Written Comment:

Pursuant to West Virginia Code § 22-6A-11(a), all persons described in subsection (b), section ten of this article may file written comments with the secretary as to the location or construction of the applicant's proposed well work within thirty days after the application is filed with the secretary. All persons described in West Virginia Code § 22-6A-10(b) may file written comments as to the location or construction of the applicant's proposed well work to the Secretary at:

Chief, Office of Oil and Gas
Department of Environmental Protection
601 57th St. SE
Charleston, WV 25304
(304) 926-0450

Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water. **NOTE: YOU ARE NOT REQUIRED TO FILE ANY COMMENT.**

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Time Limits and Methods for Filing Comments.

The law requires these materials to be served on or before the date the operator files its Application. You have **THIRTY (30) DAYS** after the filing date to file your comments. Comments must be filed in person or received in the mail by the Chief's office by the time stated above. You may call the Chief's office to be sure of the date. Check with your postmaster to ensure adequate delivery time or to arrange special expedited handling. If you have been contacted by the well operator and you have signed a "voluntary statement of no objection" to the planned work described in these materials, then the permit may be issued at any time.

Pursuant to West Virginia Code § 22-6A-11(c)(2), Any objections of the affected coal operators and coal seam owners and lessees shall be addressed through the processes and procedures that exist under sections fifteen, seventeen and forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article. The written comments filed by the parties entitled to notice under subdivisions (1), (2), (4), (5) and (6), subsection (b), section ten of this article shall be considered by the secretary in the permit issuance process, but the parties are not entitled to participate in the processes and proceedings that exist under sections fifteen, seventeen or forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article.

Comment Requirements

Your comments must be in writing and include your name, address and telephone number, the well operator's name and well number and the approximate location of the proposed well site including district and county from the application. You may add other documents, such as sketches, maps or photographs to support your comments.

Disclaimer: All comments received will be placed on our web site <http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/Pages/default.aspx> and the applicant will automatically be forwarded an email notice that such comments have been submitted. The applicant will be expected to provide a response to comments submitted by any surface owner, water purveyor or natural gas storage operator noticed within the application.

Permit Denial or Condition

The Chief has the power to deny or condition a well work permit. Pursuant to West Virginia Code § 22-6A-8(d), the permit may not be issued or be conditioned, including conditions with respect to the location of the well and access roads prior to issuance if the director determines that:

- (1) The proposed well work will constitute a hazard to the safety of persons;
- (2) The plan for soil erosion and sediment control is not adequate or effective;
- (3) Damage would occur to publicly owned lands or resources; or
- (4) The proposed well work fails to protect fresh water sources or supplies.

A permit may also be denied under West Virginia Code § 22-6A-7(k), the secretary shall deny the issuance of a permit if the secretary determines that the applicant has committed a substantial violation of a previously issued permit for a horizontal well, including the applicable erosion and sediment control plan associated with the previously issued permit, or a substantial violation of one or more of the rules promulgated under this article, and in each instance has failed to abate or seek review of the violation within the time prescribed by the secretary pursuant to the provisions of subdivisions (1) and (2), subsection (a), section five of this article and the rules promulgated hereunder, which time may not be unreasonable.

Pursuant to West Virginia Code § 22-6A-10(g), any person entitled to submit written comments to the secretary pursuant to subsection (a), section eleven of this article, shall also be entitled to receive from the secretary a copy of the permit as issued or a copy of the order modifying or denying the permit if the person requests receipt of them as a part of the written comments submitted concerning the permit application. Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

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WW-6A
(8-13)

API NO. 47-~~48~~ **47-10303249**
OPERATOR WELL NO. Lackawanna 6511
Well Pad Name: Lackawanna

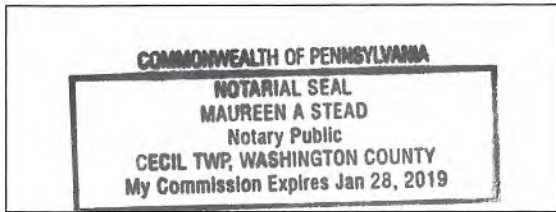
Notice is hereby given by:

Well Operator: Tug Hill Operating, LLC
Telephone: 724-749-8388
Email: amiller@tug-hill.com *amy miller*

Address: 380 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317
Facsimile: 724-338-2030

Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.



Subscribed and sworn before me this 9 day of AUG., 2018.
Maureen A Stead Notary Public
My Commission Expires 1/28/19

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WW-6A

Supplement Pg. 1A

Tug Hill Operating, LLC
 380 Southpointe BLVD, Suite 200
 Canonsburg, PA 15317

WATER WELL REPORT

Well: LACKAWANNA N-5HM
 District: Magnolia
 County: Wetzell
 State: WV

There appears to be Seven (7) possible water sources within 2,000 feet of the above referenced well location.

Topo Spot # 1 TM 12 Par. 112 Barbara McAdams 304-455-2350 6289 Veterans Hwy. New Martinsville, WV 26155	Topo Spot # 2 (Business) TM 12 Par. 112 Barbara McAdams 304-455-2350 6289 Veterans Hwy. New Martinsville, WV 26155	Topo Spot # 3 TM 12 Par. 124 M B Investments c/o J.P. Mascaro & Sons 267-933-6142 2650 Audubon Rd. Audubon, PA 19403
Topo Spot # 4 TM 12 Par. 112.1 M B Investments c/o J.P. Mascaro & Sons 267-933-6142 2650 Audubon Rd. Audubon, PA 19403	Topo Spot # 5 TM 12 Par. 43.4 M B Investments c/o J.P. Mascaro & Sons 267-933-6142 2650 Audubon Rd. Audubon, PA 19403	Topo Spot # 6 TM 12 Par. 134.1 Raymond L. & Elizabeth Pribble 304-546-3366 966 Doolin Run Rd. New Martinsville, WV 26155
Topo Spot # 7 TM 12 Par. 134.3 M B Investments c/o J.P. Mascaro & Sons 267-933-6142 2650 Audubon Rd. Audubon, PA 19403		

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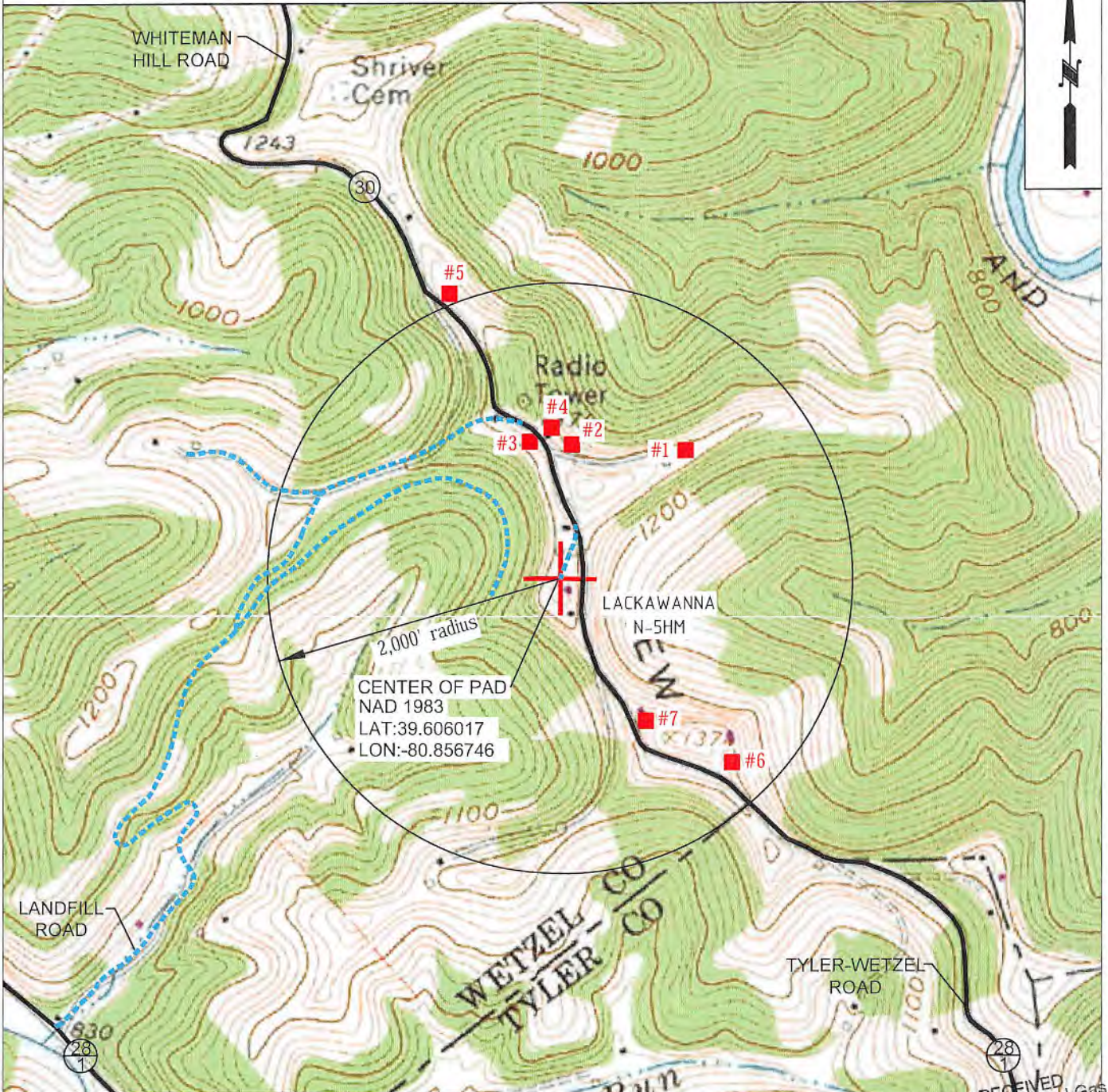
WV Department of
 Environmental Protection


WW-6A

PROPOSED LACKAWANNA N-5HM

SUPPLEMENT PG 1

There appears to be Seven (7) possible water sources within 2,000'.



 TUG HILL OPERATING	OPERATOR	494510851	TOPO SECTION	LEASE NAME
	TUG HILL OPERATING, LLC 380 SOUTHPOINTE BLVD SUITE 200 CANONSBURG, PA 15317		PORTERS FALLS 7.5'	LACKAWANNA
			SCALE: 1" = 1000'	DATE: 08-15-2018

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STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF INTENT TO DRILL

Pursuant to W. Va. Code § 22-6A-16(b), the Notice of Intent to Drill is only required if the notice requirements of W. Va. Code § 22-6A-10(a) have NOT been met or if the Notice of Intent to Drill requirement has NOT been waived in writing by the surface owner.

Notice Time Requirement: Notice shall be provided at least **TEN (10)** days prior to filing a permit application.

Date of Notice: 07/20/2018 **Date Permit Application Filed:** 08/13/2018

Delivery method pursuant to West Virginia Code § 22-6A-16(b)

HAND DELIVERY **CERTIFIED MAIL RETURN RECEIPT REQUESTED**

Pursuant to W. Va. Code § 22-6A-16(b), at least ten days prior to filing a permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner notice of its intent to enter upon the surface owner's land for the purpose of drilling a horizontal well: *Provided*, That notice given pursuant to subsection (a), section ten of this article satisfies the requirements of this subsection as of the date the notice was provided to the surface owner: *Provided, however*, That the notice requirements of this subsection may be waived in writing by the surface owner. The notice, if required, shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative.

Notice is hereby provided to the SURFACE OWNER(s):

Name: M.B. Investments, a West Virginia Partnership
Address: 2650 Audubon Road
Audubon, PA 19403

Name: Lackawanna Transport Company, a West Virginia Corporation
Address: 2650 Audubon Road
Audubon, PA 19403

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-16(b), notice is hereby given that the undersigned well operator has an intent to enter upon the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State:	<u>West Virginia</u>	UTM NAD 83	Easting:	<u>512,301.60</u>
County:	<u>Wetzel</u>		Northing:	<u>4,384,049.34</u>
District:	<u>Magnolia</u>	Public Road Access:	<u>County Route 30</u>	
Quadrangle:	<u>Porters Falls</u>	Generally used farm name:	<u>Wetzel County Sanitary Landfill</u>	
Watershed:	<u>Outlet Middle Island Creek (Undefined)</u>			

This Notice Shall Include:

Pursuant to West Virginia Code § 22-6A-16(b), this notice shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Notice is hereby given by:

Well Operator: Tug Hill Operating, LLC
Address: 380 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317
Telephone: 724-749-8388
Email: amiller@tug-hilltop.com
Facsimile: 724-338-2030

Authorized Representative: Sean Cotter
Address: 380 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317
Telephone: 724-749-8388
Email: scotter@tug-hilltop.com
Facsimile: 724-338-2030

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Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

WV Department of Environmental Protection

WW-6A5
(1/12)

Operator Well No. Lackawanna N-5HM

4710303249

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF PLANNED OPERATION

Notice Time Requirement: notice shall be provided no later than the **filing date of permit application.**

Date of Notice: 08/13/2018 **Date Permit Application Filed:** 08/14/2018

Delivery method pursuant to West Virginia Code § 22-6A-16(c)

CERTIFIED MAIL HAND
RETURN RECEIPT REQUESTED DELIVERY

Pursuant to W. Va. Code § 22-6A-16(c), no later than the date for filing the permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner whose land will be used for the drilling of a horizontal well notice of the planned operation. The notice required by this subsection shall include: (1) A copy of this code section; (2) The information required to be provided by subsection (b), section ten of this article to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. (d) The notices required by this section shall be given to the surface owner at the address listed in the records of the sheriff at the time of notice.

Notice is hereby provided to the SURFACE OWNER(s)
(at the address listed in the records of the sheriff at the time of notice):

Name: M.B. Investments, a West Virginia Partnership
Address: 2650 Audubon Road
Audubon, PA 19403

Name: Lackawanna Transport Company, A West Virginia Corporation
Address: 2650 Audubon Road
Audubon, PA 19403

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-16(c), notice is hereby given that the undersigned well operator has developed a planned operation on the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State: West Virginia UTM NAD 83 Easting: 512,301.27
County: Wetzel Northing: 4,384,042.03
District: Magnolia Public Road Access: County Route 30
Quadrangle: Porters Falls Generally used farm name: Wetzel County Sanitary Landfill
Watershed: Outlet Middle Island Creek

This Notice Shall Include:

Pursuant to West Virginia Code § 22-6A-16(c), this notice shall include: (1) A copy of this code section; (2) The information required to be provided by **W. Va. Code § 22-6A-10(b)** to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Well Operator: Tug Hill Operating, LLC
Telephone: 724-749-8388
Email: amiller@tug-hillop.com

Address: 380 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317
Facsimile: 724-338-2030

Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our Office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division of Highways

1900 Kanawha Boulevard East • Building Five • Room 110
Charleston, West Virginia 25305-0430 • (304) 558-3505

Thomas J. Smith, P. E.
Secretary of Transportation/
Commissioner of Highways

August 6, 2018

Jill M. Newman
Deputy Commissioner

James A. Martin, Chief
Office of Oil and Gas
Department of Environmental Protection
601 57th Street, SE
Charleston, WV 25304

Subject: DOH Permits for the Lackawanna Well Pad, Wetzel County
Lackawanna N-5HM Well

Dear Mr. Martin,

This well site will be accessed from Permit #06-2013-0527 transferred to Tug Hill Operating for access to the State Road for a well site located off of Wetzel County Route 30 SLS.

The operator has signed a DISTRICT WIDE OIL AND GAS ROAD MAINTENANCE BONDING AGREEMENT and provided the required Bond. This operator is currently in compliance with the DOH OIL AND GAS POLICY dated January 3, 2012.

Very Truly Yours,

A handwritten signature in blue ink that reads "Gary K. Clayton".

Gary K. Clayton, P.E.
Regional Maintenance Engineer
Central Office O&G Coordinator

Cc: Amy Miller
Tug Hill Operating
CH, OM, D-6
File

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4710303249



PLANNED ADDITIVES TO BE USED IN FRACTURING OR STIMULATION

Well No. Lackawanna N-5HM

PRODUCT NAME:	CHEMICAL DESCRIPTION:	PRODUCT USE:	HAZARDOUS COMPONENT:
GBW-20C	Hemicellulase Breaker	Breaker - Water	None
ALPHA 1427		Biocide	Glutaraldehyde – CAS#000111-30-8 Quaternary ammonium chloride CAS# 007173-51-5 Alky dimethyl benzyl ammonium Chloride (C12-16) – CAS#068424-85-1 Ethanol – CAS# 000064-17-5 Water – CAS# 007732-18-5
FRAC SAND	Silica Sand (various Mesh sizes)	Proppant	Crystalline silica (quartz) CAS# 14808-60-7
S-8C, Sand	Silica Sand (100 mesh)	Sand	Silica – CAS# 14808-60-7
GW-3LDF		Gellant - Water	Petroleum Distillate Blend – Proprietary, (Not Associated with Diesel Fuel) Guar gum – CAS# 009000-30-0
FRW-18		Friction Reducer	Hydrotreated light distillate CAS# 064742-47-8
Scaletrol		Scale Inhibitor	Ethylene glycol – CAS# 000107-21-1 Diethylene glycol – CAS# 000111-46-6

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WVDEP OOG ACCEPTED AS-BUILT 10/23/2018

Lackawanna Well Site

Site Design, Construction Plan, & Erosion and Sediment Control Plans Tug Hill Operating Wetzel County Magnolia District Outlet Middle Island Creek Watershed

Pertinent Site Information Lackawanna Well Site Emergency Number: 204-455-0980 Mingo District, Wetzel County, WV Watershed: Outlet Middle Island Creek Watershed The HDU Number: 1-817-632-3000

Table with columns: Date, Measured, Proposed, and Permitted. Includes data for Lackawanna Well Site and other related information.

Exhibit A: Final Design: Issue for Permitting

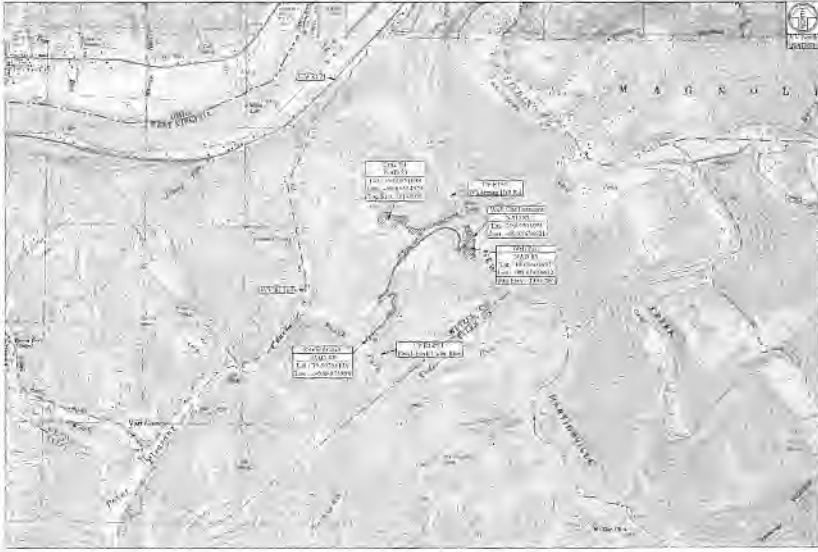


Table with columns: Area, Proposed, and Permitted. Lists various areas and their measurements.

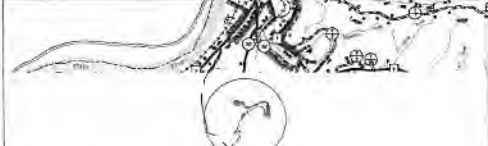
Table with columns: Disturbed Area and Proposed. Lists various disturbed areas and their measurements.

Table with columns: Well Name, Well ID, and Well Depth. Lists well site quantities.

Large table with columns: Well Name, Well ID, Well Depth, and other details. Lists numerous well sites and their specifications.

8102 - 11 Catawba Power Fall - Wetzel Outlet Middle Island Creek

Table with columns: Site Location (NAD 27) and Site Location (NAD 83). Lists site locations with coordinates.



Other Information:

- List of notes and other information regarding the site design and permitting process.



Table with columns: Sheet, Description, and other details. Lists sheet numbers and their corresponding descriptions.

Project Contacts: The Hill Operating, Mingo District, Magnolia District, etc. Includes contact information for various entities.

MEED UTILITY OF WEST VIRGINIA: Information regarding utility services and contact details for Meed Utility of West Virginia.

Appendix B: Drawing the intersection of US 87 and WV 21... Includes detailed information about the intersection and related infrastructure.

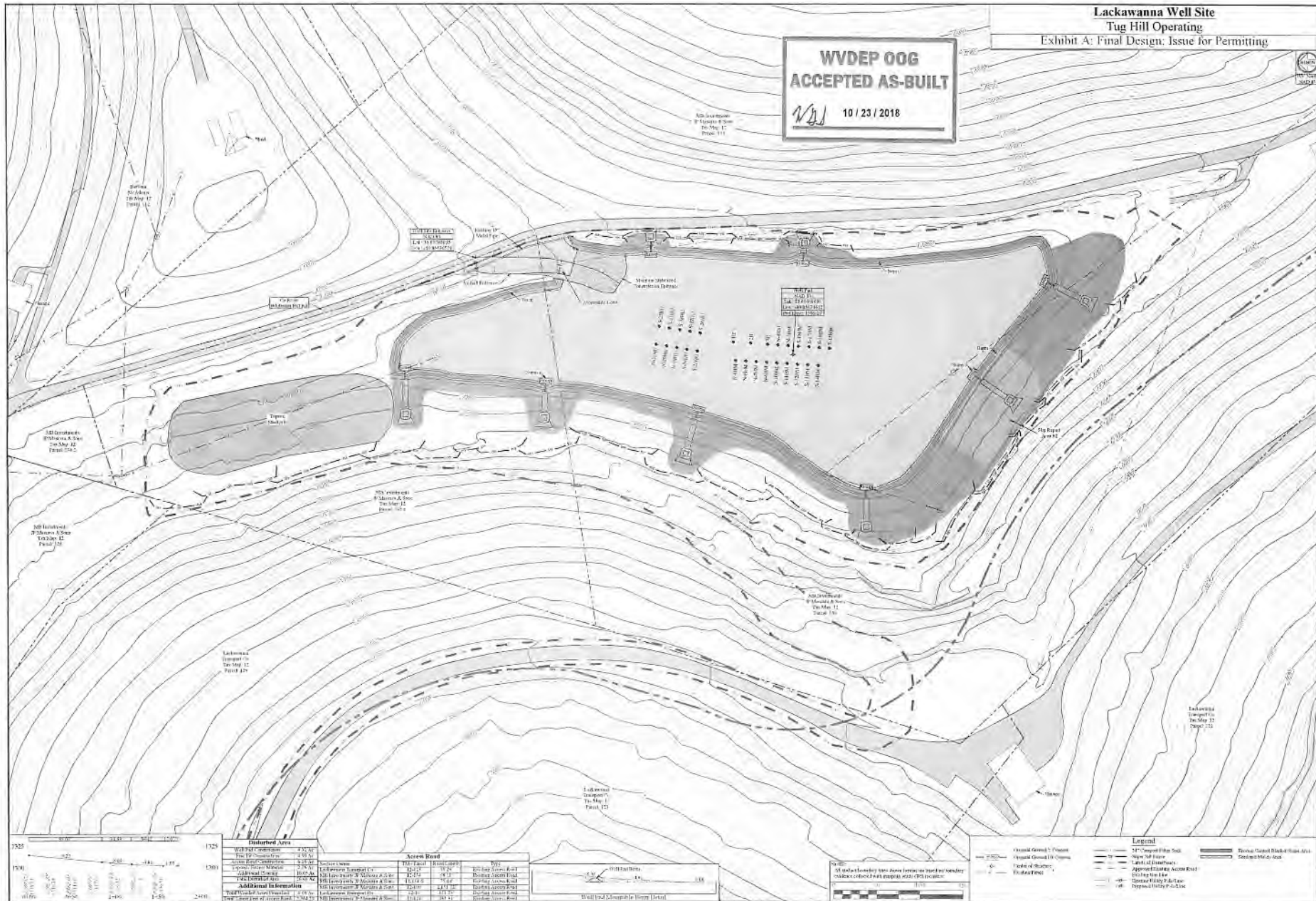
Vertical sidebar containing logos for TUG HILL, K&S, and Lackawanna Well Site, along with contact information for the Mingo District in West Virginia.

Lackawanna Well Site
Tug Hill Operating
 Exhibit A: Final Design: Issue for Permitting

WV DEP OOG
ACCEPTED AS-BUILT

[Signature] 10 / 23 / 2018

WV DEP OOG
 10 / 23 / 2018
 Page 1 of 1

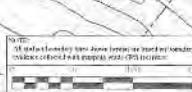


Disturbed Area

WV DEP OOG	2/20/18
Well 12	11/20/18
Well 13	11/20/18
Well 14	11/20/18
Well 15	11/20/18
Well 16	11/20/18
Well 17	11/20/18
Well 18	11/20/18
Well 19	11/20/18
Well 20	11/20/18
Well 21	11/20/18
Well 22	11/20/18
Well 23	11/20/18
Well 24	11/20/18
Well 25	11/20/18

Access Road

WV DEP OOG	2/20/18
Well 12	11/20/18
Well 13	11/20/18
Well 14	11/20/18
Well 15	11/20/18
Well 16	11/20/18
Well 17	11/20/18
Well 18	11/20/18
Well 19	11/20/18
Well 20	11/20/18
Well 21	11/20/18
Well 22	11/20/18
Well 23	11/20/18
Well 24	11/20/18
Well 25	11/20/18



Legend

---	Original Ground - Present
---	Proposed Ground - 10' Offset
---	Future 10' Offset
---	Future 20' Offset
---	Future 40' Offset
---	Future 80' Offset
---	Future 160' Offset
---	Future 320' Offset
---	Future 640' Offset
---	Future 1280' Offset
---	Future 2560' Offset
---	Future 5120' Offset
---	Future 10240' Offset
---	Future 20480' Offset
---	Future 40960' Offset
---	Future 81920' Offset

Legend

---	24" Compd Filter Seal
---	36" Compd Filter Seal
---	48" Compd Filter Seal
---	60" Compd Filter Seal
---	72" Compd Filter Seal
---	84" Compd Filter Seal
---	96" Compd Filter Seal
---	108" Compd Filter Seal
---	120" Compd Filter Seal
---	132" Compd Filter Seal
---	144" Compd Filter Seal
---	156" Compd Filter Seal
---	168" Compd Filter Seal
---	180" Compd Filter Seal
---	192" Compd Filter Seal
---	204" Compd Filter Seal
---	216" Compd Filter Seal
---	228" Compd Filter Seal
---	240" Compd Filter Seal
---	252" Compd Filter Seal
---	264" Compd Filter Seal
---	276" Compd Filter Seal
---	288" Compd Filter Seal
---	300" Compd Filter Seal
---	312" Compd Filter Seal
---	324" Compd Filter Seal
---	336" Compd Filter Seal
---	348" Compd Filter Seal
---	360" Compd Filter Seal

TUG HILL OPERATING
 PREPARED FOR
KE S Engineering
 PROJECT AND SCHEMATIC CONTROL PLAN
Lackawanna Well Site
 Monrovia District
 West Virginia