



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

Friday, October 12, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ARSENAL RESOURCES LLC
6031 WALLACE ROAD EXTENSION
SUITE 603
WEXFORD, PA 15090

Re: Permit Modification Approval for PRITT SOUTH 204
47-033-05902-00-00

Modified lateral spacing with no top-hole change

ARSENAL RESOURCES LLC

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

If there are any questions, please feel free to contact me at (304) 926- 0450.

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

James A. Martin
Chief

Operator's Well Number: PRITT SOUTH 204
Farm Name: IRA& LAURA PRITT
U.S. WELL NUMBER: 47-033-05902-00-00
Horizontal 6A New Drill
Date Modification Issued:

Promoting a healthy environment.

API NO. 47-033 - 05802 MOD

OPERATOR WELL NO. Pritt South 204

Well Pad Name: Pritt South

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

1) Well Operator: Arsenal Resources
Operator ID: 494519412
County: Harrison
District: Simpson
Quadrangle: Brownton

2) Operator's Well Number: Pritt South 204
Well Pad Name: Pritt South

3) Farm Name/Surface Owner: Ira and Laura Pritt
Public Road Access: County Route 17

4) Elevation, current ground: 1,342.90'
Elevation, proposed post-construction: 1,345.90'

5) Well Type (a) Gas X Oil Underground Storage
Other
(b) If Gas Shallow X Deep
Horizontal X

SDW
8/15/2018

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale, 7788.0ft (TVD Heel) - 7788.0ft (TVD Toe), 100ft, 0.5 psi/ft Base of Marcellus Shale, 7888.0ft (TVD Heel) - 7888.0ft (TVD Toe)

8) Proposed Total Vertical Depth: 7,874 ft

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 19,294.8 ft

11) Proposed Horizontal Leg Length: 10,982 ft

12) Approximate Fresh Water Strata Depths: 6', 36', 81', 210', 248', 291', 306', 336', 376'

13) Method to Determine Fresh Water Depths: Offsetting wells reported water depths (033-00860, 033-00860, 033-00860, 033-00878, 033-00880, 033-03282)

14) Approximate Saltwater Depths: 1391'

15) Approximate Coal Seam Depths: Batswain 463', Brush Creek 682', Upper Freeport 843', Lower Freeport 703', Upper Klansring 778', Middle Klansring 838', Lower Klansring 851'

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

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

(a) If Yes, provide Mine Info: Name:
Depth:
Seam:
Owner:
Received
OCT 4 2018

WW-6B
(04/15)

API NO. 47- 033 - 05002 *MOD*
 OPERATOR WELL NO. *Prta South 204*
 Well Pad Name: *Prta South*

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	24	New	H-40	94	80	80	CTS
Fresh Water	13.375	New	J-55	54.5	450	450	CTS
Coal							
Intermediate	9.625	New	J-55	40	1500	1500	CTS
Production	5.5	New	P-110	20	19,295	19,295	TOC @ 1,350MD
Tubing							
Liners							

*50cc
8/15/2018*

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	24	36			0	Class A, 3% CaCl ₂	1.20
Fresh Water	13.375	17.5	0.38	2730	900	Class A, 3% CaCl ₂	1.20
Coal							
Intermediate	9.625	12.25	0.395	3,950	1500	Class A, 3% CaCl ₂	1.29
Production	5.5	8.5-8.75	0.361	12,640	9500	Class A, 5080 Ppm	1.29/1.34
Tubing					5000		
Liners					N/A		

Received

PACKERS

OCT 4 2018

Kind:				
Sizes:				
Depths Set:				

Office of Oil and Gas
 WV Dept. of Environmental Protection

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

The well will be started with a conductor rig drilling a 36" hole to Conductor programmed depth then running 24" casing and circulate cement back to surface. The conductor rig will move out and the drilling rig will move in and rig up. The drilling rig will then spud a 17 1/2" hole and drill to fresh water casing (Surface) to the programmed depth, Run 13- 3/8" casing and cement to surface. The rig will continue drilling a 12- 1/4" intermediate hole to the programmed depth, run 9- 5/8" casing and cement to surface. The rig will then continue to drill an 8- 3/4" hole to a designed KOP. We will then start drilling the curve and lateral section to the programmed total measured depth, run 5 1/2" casing and cement according to the program.

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

The well will be completed using a plug and perforation method and stimulated with a slickwater and sand slurry. The anticipated maximum rate will be 90 bpm and the maximum pressure will be 9,500 psi.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 29.78

22) Area to be disturbed for well pad only, less access road (acres): 9.15

23) Describe centralizer placement for each casing string:

24" - No centralizers 13 3/8" - one bow spring centralizer on every other joint 9 5/8" - one bow spring centralizer every third joint from TD to surface 5 1/2" - one semi rigid centralizer on every joint from TD of casing to end of curve. Then every other joint to KOP. Every third joint from KOP to 1,600'; there will be no centralizers from 1,600' to surface.

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

24" will be circulated to surface. The 13 3/8" casing will be cemented to surface with Class A cement and no greater than 3% CaCl (calcium chloride). The 9 5/8" casing will be cemented to surface with Class A cement, & no greater than 3% calcium chloride. The 5 1/2" production string will be cemented back to 1,350' (+/- 150' above the casing shoe for the 9 5/8") with Class A and 50/50 Poz cement retarded (to extend pumpability) cellophane flaked for fluid loss, Bentonite gel as an extender (increased pumpability and fluid loss), a defoaming agent to decrease cement foaming during mixing to insure the cement is of proper weight to placement and possibly gypsum gas blocking additive to aid in blocking/gas migration (in combination with other additive mentioned here, helps cement achieve a "right angle" set) during the plastic phase of the cement set-up.

25) Proposed borehole conditioning procedures:

Top holes will be drilled with fresh water KOP. At KOP, the wellbore will be loaded with synthetic oil based mud, barite-weighted mud system with such properties as to build a filter-cake on the face of the bore-hole. This will provide lubricity as well as stabilizing the well bore. We will begin rotating the drill string and mud will be circulated upon reaching TD until no further cuttings are observed coming across the shaker screens. Once clean mud is circulated back to surface, we will pull three stands of drill pipe, load the hole, pull three strands and load the hole. The weight indicator on the rig will be monitored for any occurrences of drag and if any are noticed, we will re-run the previous stand of pipe pulled across and circulate 2x bottoms up while watching shakers for signs of cuttings. Once at the base curve, the string will be continuously rotated while pumping 2x bottoms up. We will pull three stands and fill the hole and we will run the vertical section of the well.

*Note: Attach additional sheets as needed.

OCT 4 2018

Page 3 of 3

33-05902 m01



Arsenal Resources


Harrison County, West Virginia NAD 83
Pritt South Pad
Pritt South #204

Wellbore #1

Plan: Design #4

QES Well Planning Report

02 April, 2018

 **QES** RECEIVED
Office of Oil and Gas
SEP 14 2018
DIRECTIONAL DRILLING
WV Department of
Environmental Protection



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Pritt South #204
Company:	Arsenal Resources	TVD Reference:	WELL @ 1372.9usft
Project:	Harrison County, West Virginia NAD 83	MD Reference:	WELL @ 1372.9usft
Site:	Pritt South Pad	North Reference:	Grid
Well:	Pritt South #204	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #4		

Project	Harrison County, West Virginia NAD 83		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	West Virginia Northern Zone		

Site	Pritt South Pad		
Site Position:		Northing:	272,369.26 usft
From:	Map	Easting:	1,773,918.84 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	39° 14' 44.725 N
		Longitude:	80° 11' 13.422 W
		Grid Convergence:	-0.44 °

Well	Pritt South #204				
Well Position	+N/-S	9.1 usft	Northing:	272,378.39 usft	
	+E/-W	-4.1 usft	Easting:	1,773,914.75 usft	
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	1,345.9 usft

Wellbore	Wellbore #1		
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	7/18/2017	-8.93	66.45	51,827.10513672

Design	Design #4		
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Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	158.42

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.00	0.00	0.00	0.00	
3,683.2	23.66	74.31	3,649.8	65.1	231.9	2.00	2.00	0.00	74.31	
3,792.9	23.66	74.31	3,750.3	77.1	274.3	0.00	0.00	0.00	0.00	
4,976.0	0.00	0.00	4,900.1	142.2	506.2	2.00	-2.00	0.00	180.00	VP Pritt South 204.
7,313.3	0.00	0.00	7,237.4	142.2	506.2	0.00	0.00	0.00	0.00	
8,313.3	90.00	161.00	7,874.0	-459.7	713.4	9.00	9.00	16.10	161.00	
19,294.8	90.00	161.00	7,874.0	-10,843.2	4,287.9	0.00	0.00	0.00	0.00	PBHL Pritt South 21

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Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Pritt South #204
Company:	Arsenal Resources	TVD Reference:	WELL @ 1372.9usft
Project:	Harrison County, West Virginia NAD 83	MD Reference:	WELL @ 1372.9usft
Site:	Pritt South Pad	North Reference:	Grid
Well:	Pritt South #204	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #4		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
Start Build 2.00										
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
2,600.0	2.00	74.31	2,600.0	0.5	1.7	0.2	2.00	2.00	0.00	0.00
2,700.0	4.00	74.31	2,699.8	1.9	6.7	0.7	2.00	2.00	0.00	0.00
2,800.0	6.00	74.31	2,799.5	4.2	15.1	1.6	2.00	2.00	0.00	0.00
2,900.0	8.00	74.31	2,898.7	7.5	26.8	2.9	2.00	2.00	0.00	0.00
3,000.0	10.00	74.31	2,997.5	11.8	41.9	4.5	2.00	2.00	0.00	0.00
3,100.0	12.00	74.31	3,095.6	16.9	60.3	6.4	2.00	2.00	0.00	0.00
3,200.0	14.00	74.31	3,193.1	23.0	81.9	8.7	2.00	2.00	0.00	0.00
3,300.0	16.00	74.31	3,289.6	30.0	106.8	11.4	2.00	2.00	0.00	0.00
3,400.0	18.00	74.31	3,385.3	37.9	135.0	14.4	2.00	2.00	0.00	0.00
3,500.0	20.00	74.31	3,479.8	46.7	166.3	17.7	2.00	2.00	0.00	0.00
3,600.0	22.00	74.31	3,573.2	56.4	200.8	21.4	2.00	2.00	0.00	0.00
Start 109.7 hold at 3683.2 MD										
3,683.2	23.66	74.31	3,649.8	65.1	231.9	24.7	2.00	2.00	0.00	0.00
3,700.0	23.66	74.31	3,665.2	67.0	238.4	25.4	0.00	0.00	0.00	0.00
Start Drop -2.00										
3,792.9	23.66	74.31	3,750.3	77.1	274.3	29.2	0.00	0.00	0.00	0.00
3,800.0	23.52	74.31	3,756.8	77.8	277.0	29.5	2.00	-2.00	0.00	0.00
3,900.0	21.52	74.31	3,849.2	88.2	313.9	33.4	2.00	-2.00	0.00	0.00
4,000.0	19.52	74.31	3,942.8	97.7	347.6	37.0	2.00	-2.00	0.00	0.00
4,100.0	17.52	74.31	4,037.7	106.3	378.2	40.3	2.00	-2.00	0.00	0.00
4,200.0	15.52	74.31	4,133.5	114.0	405.6	43.2	2.00	-2.00	0.00	0.00
4,300.0	13.52	74.31	4,230.3	120.7	429.7	45.8	2.00	-2.00	0.00	0.00
4,400.0	11.52	74.31	4,328.0	126.6	450.6	48.0	2.00	-2.00	0.00	0.00
4,500.0	9.52	74.31	4,426.3	131.5	468.2	49.9	2.00	-2.00	0.00	0.00
4,600.0	7.52	74.31	4,525.2	135.5	482.4	51.4	2.00	-2.00	0.00	0.00
4,700.0	5.52	74.31	4,624.5	138.6	493.4	52.5	2.00	-2.00	0.00	0.00

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Office of Oil and Gas

33-05902
MD



Well Planning Report



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Site:	Pritt South Pad	North Reference:	Grid
Well:	Pritt South #204	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #4		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,800.0	3.52	74.31	4,724.2	140.7	501.0	53.3	2.00	-2.00	0.00
4,900.0	1.52	74.31	4,824.1	141.9	505.2	53.8	2.00	-2.00	0.00
Start 2337.3 hold at 4976.0 MD									
4,976.0	0.00	0.00	4,900.1	142.2	506.2	53.9	2.00	-2.00	0.00
5,000.0	0.00	0.00	4,924.1	142.2	506.2	53.9	0.00	0.00	0.00
5,100.0	0.00	0.00	5,024.1	142.2	506.2	53.9	0.00	0.00	0.00
5,200.0	0.00	0.00	5,124.1	142.2	506.2	53.9	0.00	0.00	0.00
5,300.0	0.00	0.00	5,224.1	142.2	506.2	53.9	0.00	0.00	0.00
5,400.0	0.00	0.00	5,324.1	142.2	506.2	53.9	0.00	0.00	0.00
5,500.0	0.00	0.00	5,424.1	142.2	506.2	53.9	0.00	0.00	0.00
5,600.0	0.00	0.00	5,524.1	142.2	506.2	53.9	0.00	0.00	0.00
5,700.0	0.00	0.00	5,624.1	142.2	506.2	53.9	0.00	0.00	0.00
5,800.0	0.00	0.00	5,724.1	142.2	506.2	53.9	0.00	0.00	0.00
5,900.0	0.00	0.00	5,824.1	142.2	506.2	53.9	0.00	0.00	0.00
6,000.0	0.00	0.00	5,924.1	142.2	506.2	53.9	0.00	0.00	0.00
6,100.0	0.00	0.00	6,024.1	142.2	506.2	53.9	0.00	0.00	0.00
6,200.0	0.00	0.00	6,124.1	142.2	506.2	53.9	0.00	0.00	0.00
6,300.0	0.00	0.00	6,224.1	142.2	506.2	53.9	0.00	0.00	0.00
6,400.0	0.00	0.00	6,324.1	142.2	506.2	53.9	0.00	0.00	0.00
6,500.0	0.00	0.00	6,424.1	142.2	506.2	53.9	0.00	0.00	0.00
6,600.0	0.00	0.00	6,524.1	142.2	506.2	53.9	0.00	0.00	0.00
6,700.0	0.00	0.00	6,624.1	142.2	506.2	53.9	0.00	0.00	0.00
6,800.0	0.00	0.00	6,724.1	142.2	506.2	53.9	0.00	0.00	0.00
6,900.0	0.00	0.00	6,824.1	142.2	506.2	53.9	0.00	0.00	0.00
7,000.0	0.00	0.00	6,924.1	142.2	506.2	53.9	0.00	0.00	0.00
7,100.0	0.00	0.00	7,024.1	142.2	506.2	53.9	0.00	0.00	0.00
7,200.0	0.00	0.00	7,124.1	142.2	506.2	53.9	0.00	0.00	0.00
7,300.0	0.00	0.00	7,224.1	142.2	506.2	53.9	0.00	0.00	0.00
Start DLS 9.00 TFO 161.00									
7,313.3	0.00	0.00	7,237.4	142.2	506.2	53.9	0.00	0.00	0.00
7,350.0	3.30	161.00	7,274.1	141.2	506.5	55.0	9.00	9.00	0.00
7,400.0	7.80	161.00	7,323.8	136.6	508.1	59.8	9.00	9.00	0.00
7,450.0	12.30	161.00	7,373.0	128.4	510.9	68.5	9.00	9.00	0.00
7,500.0	16.80	161.00	7,421.4	116.5	515.0	81.0	9.00	9.00	0.00
7,550.0	21.30	161.00	7,468.7	101.1	520.3	97.3	9.00	9.00	0.00
7,600.0	25.80	161.00	7,514.5	82.2	526.8	117.3	9.00	9.00	0.00
7,650.0	30.30	161.00	7,558.6	60.0	534.5	140.8	9.00	9.00	0.00
7,700.0	34.80	161.00	7,600.7	34.5	543.2	167.6	9.00	9.00	0.00
7,750.0	39.30	161.00	7,640.6	6.1	553.0	197.7	9.00	9.00	0.00
7,800.0	43.80	161.00	7,678.0	-25.3	563.8	230.9	9.00	9.00	0.00
7,850.0	48.30	161.00	7,712.7	-59.3	575.5	266.8	9.00	9.00	0.00
7,900.0	52.80	161.00	7,744.5	-95.8	588.1	305.4	9.00	9.00	0.00
7,950.0	57.30	161.00	7,773.1	-134.6	601.4	346.3	9.00	9.00	0.00
8,000.0	61.80	161.00	7,798.5	-175.3	615.5	389.3	9.00	9.00	0.00
8,050.0	66.30	161.00	7,820.3	-217.8	630.1	434.3	9.00	9.00	0.00
8,100.0	70.80	161.00	7,838.6	-261.8	645.3	480.7	9.00	9.00	0.00
8,150.0	75.30	161.00	7,853.2	-307.0	660.8	528.5	9.00	9.00	0.00
8,200.0	79.80	161.00	7,864.0	-353.2	676.7	577.3	9.00	9.00	0.00
8,250.0	84.30	161.00	7,870.9	-400.0	692.8	626.7	9.00	9.00	0.00
8,300.0	88.80	161.00	7,873.9	-447.1	709.1	676.6	9.00	9.00	0.00
Start 10981.5 hold at 8313.3 MD									
8,313.3	90.00	161.00	7,874.0	-459.7	713.4	689.9	9.00	9.00	0.00
8,400.0	90.00	161.00	7,874.0	-541.7	741.6	776.5	0.00	0.00	0.00

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Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Pritt South #204
Company:	Arsenal Resources	TVD Reference:	WELL @ 1372.9usft
Project:	Harrison County, West Virginia NAD 83	MD Reference:	WELL @ 1372.9usft
Site:	Pritt South Pad	North Reference:	Grid
Well:	Pritt South #204	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #4		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
8,500.0	90.00	161.00	7,874.0	-636.3	774.2	876.4	0.00	0.00	0.00	
8,600.0	90.00	161.00	7,874.0	-730.8	806.7	976.3	0.00	0.00	0.00	
8,700.0	90.00	161.00	7,874.0	-825.4	839.3	1,076.2	0.00	0.00	0.00	
8,800.0	90.00	161.00	7,874.0	-919.9	871.8	1,176.1	0.00	0.00	0.00	
8,900.0	90.00	161.00	7,874.0	-1,014.5	904.4	1,276.0	0.00	0.00	0.00	
9,000.0	90.00	161.00	7,874.0	-1,109.0	936.9	1,375.9	0.00	0.00	0.00	
9,100.0	90.00	161.00	7,874.0	-1,203.6	969.5	1,475.7	0.00	0.00	0.00	
9,200.0	90.00	161.00	7,874.0	-1,298.1	1,002.0	1,575.6	0.00	0.00	0.00	
9,300.0	90.00	161.00	7,874.0	-1,392.7	1,034.6	1,675.5	0.00	0.00	0.00	
9,400.0	90.00	161.00	7,874.0	-1,487.2	1,067.1	1,775.4	0.00	0.00	0.00	
9,500.0	90.00	161.00	7,874.0	-1,581.8	1,099.7	1,875.3	0.00	0.00	0.00	
9,600.0	90.00	161.00	7,874.0	-1,676.3	1,132.2	1,975.2	0.00	0.00	0.00	
9,700.0	90.00	161.00	7,874.0	-1,770.9	1,164.8	2,075.1	0.00	0.00	0.00	
9,800.0	90.00	161.00	7,874.0	-1,865.5	1,197.3	2,175.0	0.00	0.00	0.00	
9,900.0	90.00	161.00	7,874.0	-1,960.0	1,229.9	2,274.9	0.00	0.00	0.00	
10,000.0	90.00	161.00	7,874.0	-2,054.6	1,262.4	2,374.8	0.00	0.00	0.00	
10,100.0	90.00	161.00	7,874.0	-2,149.1	1,295.0	2,474.7	0.00	0.00	0.00	
10,200.0	90.00	161.00	7,874.0	-2,243.7	1,327.5	2,574.6	0.00	0.00	0.00	
10,300.0	90.00	161.00	7,874.0	-2,338.2	1,360.1	2,674.5	0.00	0.00	0.00	
10,400.0	90.00	161.00	7,874.0	-2,432.8	1,392.6	2,774.4	0.00	0.00	0.00	
10,500.0	90.00	161.00	7,874.0	-2,527.3	1,425.2	2,874.3	0.00	0.00	0.00	
10,600.0	90.00	161.00	7,874.0	-2,621.9	1,457.7	2,974.2	0.00	0.00	0.00	
10,700.0	90.00	161.00	7,874.0	-2,716.4	1,490.3	3,074.1	0.00	0.00	0.00	
10,800.0	90.00	161.00	7,874.0	-2,811.0	1,522.8	3,174.0	0.00	0.00	0.00	
10,900.0	90.00	161.00	7,874.0	-2,905.5	1,555.4	3,273.9	0.00	0.00	0.00	
11,000.0	90.00	161.00	7,874.0	-3,000.1	1,587.9	3,373.8	0.00	0.00	0.00	
11,100.0	90.00	161.00	7,874.0	-3,094.7	1,620.5	3,473.7	0.00	0.00	0.00	
11,200.0	90.00	161.00	7,874.0	-3,189.2	1,653.0	3,573.6	0.00	0.00	0.00	
11,300.0	90.00	161.00	7,874.0	-3,283.8	1,685.6	3,673.5	0.00	0.00	0.00	
11,400.0	90.00	161.00	7,874.0	-3,378.3	1,718.1	3,773.4	0.00	0.00	0.00	
11,500.0	90.00	161.00	7,874.0	-3,472.9	1,750.7	3,873.3	0.00	0.00	0.00	
11,600.0	90.00	161.00	7,874.0	-3,567.4	1,783.2	3,973.2	0.00	0.00	0.00	
11,700.0	90.00	161.00	7,874.0	-3,662.0	1,815.8	4,073.1	0.00	0.00	0.00	
11,800.0	90.00	161.00	7,874.0	-3,756.5	1,848.3	4,173.0	0.00	0.00	0.00	
11,900.0	90.00	161.00	7,874.0	-3,851.1	1,880.9	4,272.9	0.00	0.00	0.00	
12,000.0	90.00	161.00	7,874.0	-3,945.6	1,913.4	4,372.8	0.00	0.00	0.00	
12,100.0	90.00	161.00	7,874.0	-4,040.2	1,946.0	4,472.7	0.00	0.00	0.00	
12,200.0	90.00	161.00	7,874.0	-4,134.7	1,978.5	4,572.6	0.00	0.00	0.00	
12,300.0	90.00	161.00	7,874.0	-4,229.3	2,011.1	4,672.5	0.00	0.00	0.00	
12,400.0	90.00	161.00	7,874.0	-4,323.9	2,043.6	4,772.4	0.00	0.00	0.00	
12,500.0	90.00	161.00	7,874.0	-4,418.4	2,076.2	4,872.3	0.00	0.00	0.00	
12,600.0	90.00	161.00	7,874.0	-4,513.0	2,108.7	4,972.2	0.00	0.00	0.00	
12,700.0	90.00	161.00	7,874.0	-4,607.5	2,141.3	5,072.1	0.00	0.00	0.00	
12,800.0	90.00	161.00	7,874.0	-4,702.1	2,173.8	5,172.0	0.00	0.00	0.00	
12,900.0	90.00	161.00	7,874.0	-4,796.6	2,206.4	5,271.9	0.00	0.00	0.00	
13,000.0	90.00	161.00	7,874.0	-4,891.2	2,238.9	5,371.8	0.00	0.00	0.00	
13,100.0	90.00	161.00	7,874.0	-4,985.7	2,271.5	5,471.7	0.00	0.00	0.00	
13,200.0	90.00	161.00	7,874.0	-5,080.3	2,304.0	5,571.6	0.00	0.00	0.00	
13,300.0	90.00	161.00	7,874.0	-5,174.8	2,336.6	5,671.5	0.00	0.00	0.00	
13,400.0	90.00	161.00	7,874.0	-5,269.4	2,369.1	5,771.4	0.00	0.00	0.00	
13,500.0	90.00	161.00	7,874.0	-5,363.9	2,401.7	5,871.3	0.00	0.00	0.00	
13,600.0	90.00	161.00	7,874.0	-5,458.5	2,434.2	5,971.2	0.00	0.00	0.00	
13,700.0	90.00	161.00	7,874.0	-5,553.1	2,466.8	6,071.1	0.00	0.00	0.00	
13,800.0	90.00	161.00	7,874.0	-5,647.6	2,499.3	6,171.0	0.00	0.00	0.00	

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Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Pritt South #204
Company:	Arsenal Resources	TVD Reference:	WELL @ 1372.9usft
Project:	Harrison County, West Virginia NAD 83	MD Reference:	WELL @ 1372.9usft
Site:	Pritt South Pad	North Reference:	Grid
Well:	Pritt South #204	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #4		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
13,900.0	90.00	161.00	7,874.0	-5,742.2	2,531.9	6,270.9	0.00	0.00	0.00	
14,000.0	90.00	161.00	7,874.0	-5,836.7	2,564.4	6,370.8	0.00	0.00	0.00	
14,100.0	90.00	161.00	7,874.0	-5,931.3	2,597.0	6,470.7	0.00	0.00	0.00	
14,200.0	90.00	161.00	7,874.0	-6,025.8	2,629.5	6,570.6	0.00	0.00	0.00	
14,300.0	90.00	161.00	7,874.0	-6,120.4	2,662.1	6,670.5	0.00	0.00	0.00	
14,400.0	90.00	161.00	7,874.0	-6,214.9	2,694.7	6,770.4	0.00	0.00	0.00	
14,500.0	90.00	161.00	7,874.0	-6,309.5	2,727.2	6,870.3	0.00	0.00	0.00	
14,600.0	90.00	161.00	7,874.0	-6,404.0	2,759.8	6,970.2	0.00	0.00	0.00	
14,700.0	90.00	161.00	7,874.0	-6,498.6	2,792.3	7,070.1	0.00	0.00	0.00	
14,800.0	90.00	161.00	7,874.0	-6,593.2	2,824.9	7,170.0	0.00	0.00	0.00	
14,900.0	90.00	161.00	7,874.0	-6,687.7	2,857.4	7,269.9	0.00	0.00	0.00	
15,000.0	90.00	161.00	7,874.0	-6,782.3	2,890.0	7,369.8	0.00	0.00	0.00	
15,100.0	90.00	161.00	7,874.0	-6,876.8	2,922.5	7,469.7	0.00	0.00	0.00	
15,200.0	90.00	161.00	7,874.0	-6,971.4	2,955.1	7,569.6	0.00	0.00	0.00	
15,300.0	90.00	161.00	7,874.0	-7,065.9	2,987.6	7,669.5	0.00	0.00	0.00	
15,400.0	90.00	161.00	7,874.0	-7,160.5	3,020.2	7,769.4	0.00	0.00	0.00	
15,500.0	90.00	161.00	7,874.0	-7,255.0	3,052.7	7,869.3	0.00	0.00	0.00	
15,600.0	90.00	161.00	7,874.0	-7,349.6	3,085.3	7,969.2	0.00	0.00	0.00	
15,700.0	90.00	161.00	7,874.0	-7,444.1	3,117.8	8,069.1	0.00	0.00	0.00	
15,800.0	90.00	161.00	7,874.0	-7,538.7	3,150.4	8,169.0	0.00	0.00	0.00	
15,900.0	90.00	161.00	7,874.0	-7,633.2	3,182.9	8,268.9	0.00	0.00	0.00	
16,000.0	90.00	161.00	7,874.0	-7,727.8	3,215.5	8,368.8	0.00	0.00	0.00	
16,100.0	90.00	161.00	7,874.0	-7,822.4	3,248.0	8,468.7	0.00	0.00	0.00	
16,200.0	90.00	161.00	7,874.0	-7,916.9	3,280.6	8,568.6	0.00	0.00	0.00	
16,300.0	90.00	161.00	7,874.0	-8,011.5	3,313.1	8,668.5	0.00	0.00	0.00	
16,400.0	90.00	161.00	7,874.0	-8,106.0	3,345.7	8,768.3	0.00	0.00	0.00	
16,500.0	90.00	161.00	7,874.0	-8,200.6	3,378.2	8,868.2	0.00	0.00	0.00	
16,600.0	90.00	161.00	7,874.0	-8,295.1	3,410.8	8,968.1	0.00	0.00	0.00	
16,700.0	90.00	161.00	7,874.0	-8,389.7	3,443.3	9,068.0	0.00	0.00	0.00	
16,800.0	90.00	161.00	7,874.0	-8,484.2	3,475.9	9,167.9	0.00	0.00	0.00	
16,900.0	90.00	161.00	7,874.0	-8,578.8	3,508.4	9,267.8	0.00	0.00	0.00	
17,000.0	90.00	161.00	7,874.0	-8,673.3	3,541.0	9,367.7	0.00	0.00	0.00	
17,100.0	90.00	161.00	7,874.0	-8,767.9	3,573.5	9,467.6	0.00	0.00	0.00	
17,200.0	90.00	161.00	7,874.0	-8,862.4	3,606.1	9,567.5	0.00	0.00	0.00	
17,300.0	90.00	161.00	7,874.0	-8,957.0	3,638.6	9,667.4	0.00	0.00	0.00	
17,400.0	90.00	161.00	7,874.0	-9,051.6	3,671.2	9,767.3	0.00	0.00	0.00	
17,500.0	90.00	161.00	7,874.0	-9,146.1	3,703.7	9,867.2	0.00	0.00	0.00	
17,600.0	90.00	161.00	7,874.0	-9,240.7	3,736.3	9,967.1	0.00	0.00	0.00	
17,700.0	90.00	161.00	7,874.0	-9,335.2	3,768.8	10,067.0	0.00	0.00	0.00	
17,800.0	90.00	161.00	7,874.0	-9,429.8	3,801.4	10,166.9	0.00	0.00	0.00	
17,900.0	90.00	161.00	7,874.0	-9,524.3	3,833.9	10,266.8	0.00	0.00	0.00	
18,000.0	90.00	161.00	7,874.0	-9,618.9	3,866.5	10,366.7	0.00	0.00	0.00	
18,100.0	90.00	161.00	7,874.0	-9,713.4	3,899.0	10,466.6	0.00	0.00	0.00	
18,200.0	90.00	161.00	7,874.0	-9,808.0	3,931.6	10,566.5	0.00	0.00	0.00	
18,300.0	90.00	161.00	7,874.0	-9,902.5	3,964.1	10,666.4	0.00	0.00	0.00	
18,400.0	90.00	161.00	7,874.0	-9,997.1	3,996.7	10,766.3	0.00	0.00	0.00	
18,500.0	90.00	161.00	7,874.0	-10,091.6	4,029.2	10,866.2	0.00	0.00	0.00	
18,600.0	90.00	161.00	7,874.0	-10,186.2	4,061.8	10,966.1	0.00	0.00	0.00	
18,700.0	90.00	161.00	7,874.0	-10,280.8	4,094.3	11,066.0	0.00	0.00	0.00	
18,800.0	90.00	161.00	7,874.0	-10,375.3	4,126.9	11,165.9	0.00	0.00	0.00	
18,900.0	90.00	161.00	7,874.0	-10,469.9	4,159.4	11,265.8	0.00	0.00	0.00	
19,000.0	90.00	161.00	7,874.0	-10,564.4	4,192.0	11,365.7	0.00	0.00	0.00	
19,100.0	90.00	161.00	7,874.0	-10,659.0	4,224.5	11,465.6	0.00	0.00	0.00	
19,200.0	90.00	161.00	7,874.0	-10,753.5	4,257.1	11,565.5	0.00	0.00	0.00	



Well Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Pritt South #204
Company:	Arsenal Resources	TVD Reference:	WELL @ 1372.9usft
Project:	Harrison County, West Virginia NAD 83	MD Reference:	WELL @ 1372.9usft
Site:	Pritt South Pad	North Reference:	Grid
Well:	Pritt South #204	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #4		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
TD at 19294.8									
19,294.8	90.00	161.00	7,874.0	-10,843.2	4,287.9	11,660.2	0.00	0.00	0.00

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL Pritt South 204. - hit/miss target - plan hits target center - Point	0.00	360.00	7,874.0	-10,843.2	4,287.9	261,535.20	1,778,202.70	39° 12' 57.964 N	80° 10' 17.940 W
LP Pritt South 204. - plan hits target center - Point	0.00	0.00	7,874.0	-459.7	713.4	271,918.65	1,774,628.15	39° 14' 40.325 N	80° 11' 4.363 W

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
2,500.0	2,500.0	0.0	0.0	Start Build 2.00	
3,683.2	3,649.8	65.1	231.9	Start 109.7 hold at 3683.2 MD	
3,792.9	3,750.3	77.1	274.3	Start Drop -2.00	
4,976.0	4,900.1	142.2	506.2	Start 2337.3 hold at 4976.0 MD	
7,313.3	7,237.4	142.2	506.2	Start DLS 9.00 TFO 161.00	
8,313.3	7,874.0	-459.7	713.4	Start 10981.5 hold at 8313.3 MD	
19,294.8	7,874.0	-10,843.2	4,287.9	TD at 19294.8	

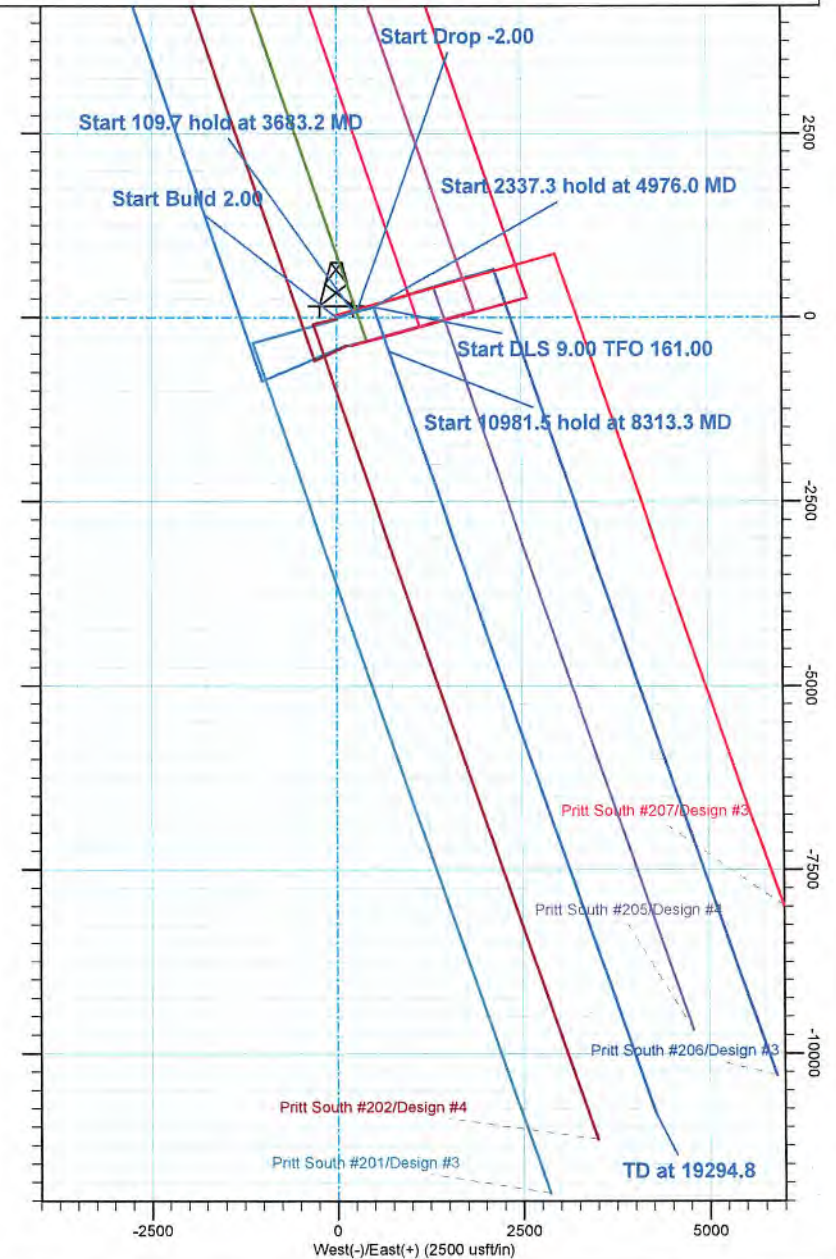
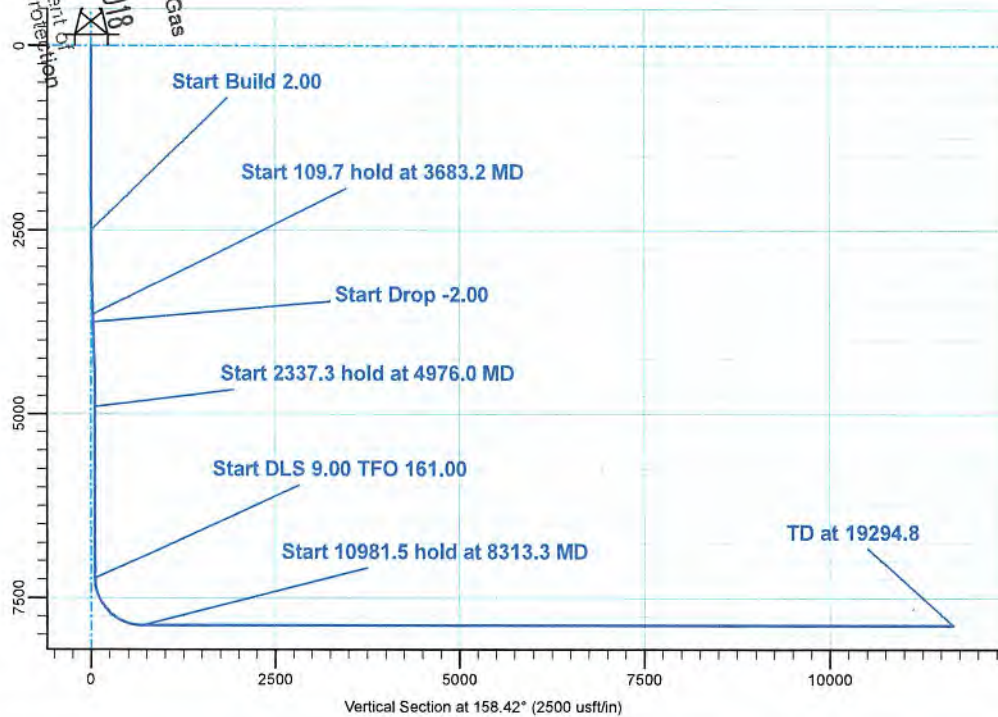


Arsenal Resources
 Harrison County, West Virginia NAD 83
 Pritt South Pad
 Pritt South #204
 Design #4

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Departure	Annotation
2500.0	0.00	0.00	2500.0	0.0	0.0	0.0	0.0	Start Build 2.00
3683.2	23.66	74.31	3649.8	65.1	231.9	24.7	240.9	Start 109.7 hold at 3683.2 MD
3792.9	23.66	74.31	3750.3	77.1	274.3	29.2	284.9	Start Drop -2.00
4976.0	0.00	0.00	4900.1	142.2	506.2	53.9	525.8	Start 2337.3 hold at 4976.0 MD
7313.3	0.00	0.00	7237.4	142.2	506.2	53.9	525.8	Start DLS 9.00 TFO 161.00
8313.3	90.00	161.00	7874.0	-459.7	713.4	689.9	1162.4	Start 10981.5 hold at 8313.3 MD
19294.8	90.00	161.00	7874.0	-10843.2	4287.9	11660.2	12143.9	TD at 19294.8

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33-05902.mxd



Purpose

The purpose of this pad-specific Hydraulic Fracturing Monitoring Plan is to identify and notify conventional well operators near Arsenal Resources hydraulic fracturing in Harrison and Barbour County, WV prior to hydraulic fracturing at the following Arsenal Resources wells on the Pritt South pad, 204 well.

Due to the apparent presence of unique geological conditions, the potential for communication between deep geologic zones exists in this area. This potential communication, via natural gas, water, or both, may occur between hydraulically fractured wells in the Marcellus formation (approximately 7,900' TVD) and existing conventional natural gas wells in the partially-depleted, relatively high permeability Benson formation (approximately 5,100' TVD).

The plan is being implemented as an additional safety measure to be utilized in conjunction with best management practices and emergency action plans for this site. These additional measures include pre-notification of conventional well operators of the timing and location of the hydraulic fracturing, establishment of measures conventional well operators should implement, and assurance that the Division of Oil and Gas is notified of the timeline, as well as any issues that may arise during fracturing.

1. Communications with Conventional Operators.

Arsenal Resources, using available data (WV Geological Survey, WVDEP Website, and IHS data service), has identified all known conventional wells and well operators within 500 feet of this pad and the lateral sections. A map showing these wells along with a list of the wells and operators is included in Attachment A.

Upon approval of this plan, Arsenal Resources will notify these operators, via letter, of the hydraulic fracturing schedule for these wells. A copy of this letter is included in Attachment B.

The letter provides recommendations to these conventional operators to 1) increase their monitoring of their wells during that time period, 2) ensure that their well head equipment is sound, and 3) provide immediate notification to Arsenal Resources and the OOG in the event of any changes in their well conditions.

Specifically, the letter recommends that conventional well operators conduct the following activities during and after fracturing operations:

1. Inspect their surface equipment prior to fracturing to establish integrity and establish pre-frac well conditions.
2. Observe wells closely during and after fracturing and monitor for abnormal increases in water, gas or pressure.
3. Inspect or install master valves rated to 3,000 psi or other necessary equipment for wellhead integrity.
4. Notify the OOG and Arsenal Resources if any changes in water, gas production, pressure or other anomalies are identified.

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2. Reporting

Arsenal Resources will provide information relating to the hydraulic fracturing schedule, communication with conventional operators, and ongoing monitoring of the work upon request of OOG or immediately after any event of any noted abnormalities.

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T.H. LATITUDE 39°15'00"
B.H. LATITUDE 39°15'00"

ARSENAL RESOURCES T.H. PRITT SOUTH 204

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)

NAD'83 S.P.C.(FT) N. 272,378.4 E. 1,773,914.8
 NAD'83 GEO. LAT.(N) 39.245782 LONG.(W) 80.187076
 NAD'83 UTM (M) N. 4,344,366.7 E. 570,148.8

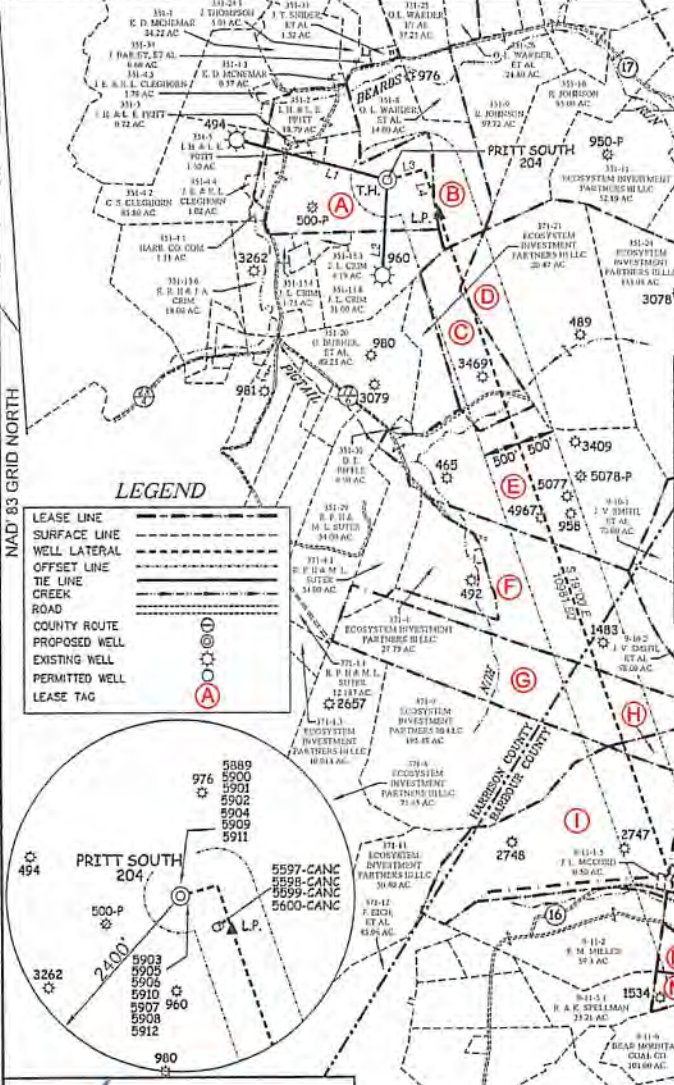
LANDING POINT

NAD'83 S.P.C.(FT) N. 271,918.7 E. 1,774,628.2
 NAD'83 GEO. LAT.(N) 39.244535 LONG.(W) 80.184545
 NAD'83 UTM (M) N. 4,344,230.2 E. 570,365.4

BOTTOM HOLE

NAD'83 S.P.C.(FT) N. 261,535.2 E. 1,778,202.7
 NAD'83 GEO. LAT.(N) 39.216101 LONG.(W) 80.171650
 NAD'83 UTM (M) N. 4,341,004.8 E. 571,510.1

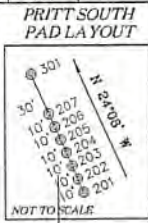
T.H. LONGITUDE 80°10'00"
B.H. LONGITUDE 80°10'00"



TAG	SURFACE OWNER	TAX MAP PARCEL	ACREAGE
HARRISON COUNTY			
A	IRA H & LAURA E. PRITT	351-4	69.09±
B	ORAN LEE WARDER, ET AL.	351-7	31.00±
C	ECOSYSTEM INVESTMENT PARTNERS III LLC	351-22	39.25±
D	ECOSYSTEM INVESTMENT PARTNERS III LLC	351-23	107.60±
E	ECOSYSTEM INVESTMENT PARTNERS III LLC	351-31	120.73±
F	ECOSYSTEM INVESTMENT PARTNERS III LLC	371-4	99.83±
G	ECOSYSTEM INVESTMENT PARTNERS III LLC	371-3	95.98±
HARRISBURG COUNTY			
H	POLINO ENTERPRISES, INC.	12-1	12.7±
I	BICKWITH LUMBER CO. INC.	11-12	172.0±
J	JAMIE MCCORD	11-1-4	4.50±
K	JAMES A. FOSTER	11-1-3	2.93±
L	JAMES FOSTEL	11-1	17.00±
M	SCOTTIE W. FARRIS	11-4	8.40±
N	MYRTLE ELLEN FARRIS	11-5	9.46±

PRITT SOUTH 204 WELL TIES

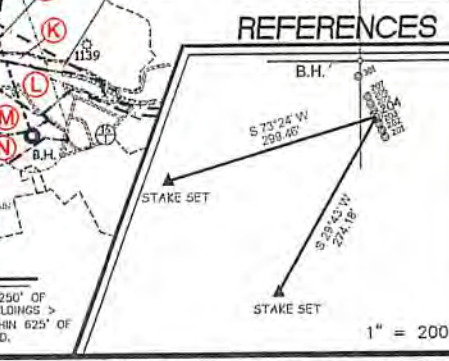
LINE	BEARING	DISTANCE
L1	N 75°24' W	2138.07'
L2	S 02°53' W	1292.44'
L3	N 74°18' E	525.77'
L4	S 19°00' E	628.62'



SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 • 12 Vanhook Drive • Glenville, WV 26031 • (204) 462-5634
www.slsurvey.com

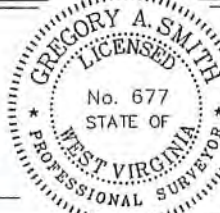
NOTES ON SURVEY

1. NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS > 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.



I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAN IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.

P.S.
677 *Gregory A. Smith*



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

DATE AUGUST 15, 20 17

REVISED 08/28/18 & 09/12/18

OPERATORS WELL NO. PRITT SOUTH 204

API WELL NO. 47 - 033 - 5902 mob

STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8383P204R6.dwg

HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

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

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL IF "GAS" PRODUCTION STORAGE DEEP SHALLOW

LOCATION:
ELEVATION EXISTING: 1,342.90' / PROPOSED: 1,345.60' WATERSHED BEARDS RUN & PIGTAIL RUN

DISTRICT SIMPSON COUNTY HARRISON QUADRANGLE BROWNTON 7.5'

SURFACE OWNER IRA & LAURA PRITT ACREAGE 69.096±

ROYALTY OWNER IRA & LAURA PRITT ET AL ACREAGE 69.096±

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

FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON CLEAN OUT AND REPLUG OTHER

PHYSICAL CHANGE IN WELL (SPECIFY) _____ TARGET FORMATION MARCELLUS

ESTIMATED DEPTH 19,294.8' TMD / 7,874' TVD

WELL OPERATOR ARSENAL RESOURCES DESIGNATED AGENT WILLIAM VEIGEL

ADDRESS 6031 WALLACE RD. EXT. SUITE 300 ADDRESS 65 PROFESSIONAL PLACE

WEXFORD, PA 15090 BRIDGEPORT, WV 26330

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AOR - Attachment A



Click or tap to enter a date.

EQT Production Company

Address

State

RE: Click or tap here to enter text.

Dear Sir/Madam,

Arsenal Resources has developed a Marcellus pad Pritt South, 204 well, located in Harrison County, WV. As an owner or operator of conventional natural gas wells in this area, we are requesting your assistance in this matter.

Due to the apparent presence of unique geological conditions, the potential for communication between deep geologic zones exists in this area. This potential communication, via natural gas, water, or both, may occur between hydraulically fractured wells in the Marcellus formation (approximately 7,900' TVD) and existing conventional natural gas wells included in the attached well list for which you are believed to be the operator.

ARSENAL RESOURCES anticipates conducting hydraulic fracturing at the Pritt South pad, 204 well during the Quarter of 2019. We have identified conventional natural gas wells operated by your company within 500' (lateral distance) of our newly planned wells. Plats for each well on this pad are attached.

We recommend that conventional well operators conduct the following activities before, during and after fracturing operations:

1. Inspect surface equipment, prior to fracturing, to establish integrity and establish well conditions.
2. Observe wells closely during and after fracturing and monitor for abnormal increases in water, gas, or pressure.
3. Inspect or install master valves rated to 3,000 psi or other necessary equipment for wellhead integrity.
4. Notify the OOG and ARSENAL RESOURCES if any changes in water, gas production, pressure or other anomalies are identified.

Please feel free to contact me at 724-940-1218 with any questions or comments. You may also contact the WV Office of Oil and Gas at 304-926-0499.

Sincerely,

Kelly Davis
Permitting Specialist

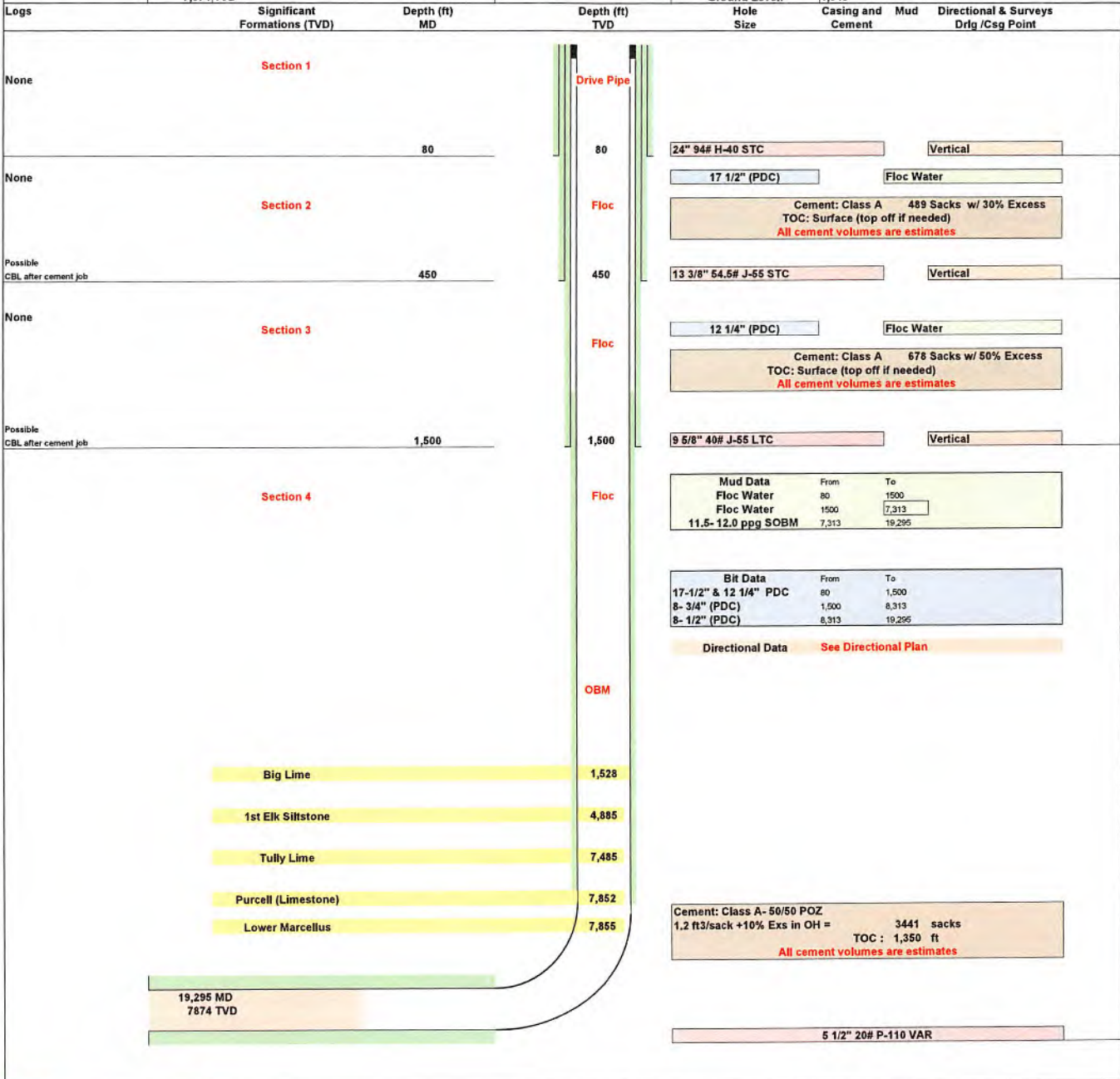
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Arsenal Resources
Pritt South 204
Casing Design
Directional Plan # 4 OES

Other Names:	N/A
Surface Location:	TBD
Bottom Hole Location:	TBD
Total Depth:	19,295 MD (ft) 7,874 TVD

County:	Harrison		
State:	West Virginia		
AFE #:	XX	API #:	XX
RKB:	27		
Ground Level:	1,345		



Revision 1
Note: Not drawn to scale
Cement Outside Casing Seal Assembly in Annulus
Date Last Revised: 13-Aug-18
Jarrett Toms

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SITE SAFETY PLAN

Pritt South Pad, Well #204

911 Address:

SDW
8/15/2018

3460 Green Valley Road

Bridgeport, WV 26330

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WW-6A1
(5/13)

Operator's Well No. Pritt South 204

**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				

**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

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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: Arsenal Resources
 By: William Veigel
 Its: Designated Agent

Attachment to WW-6A1, Pritt South 204

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
A [00006622]	Ira Pritt and Laura E. Pritt, Husband and Wife	Carrizo (Marcellus) LLC	15.00%	1448 / 804 1579/26	92.06
	Carrizo (Marcellus) LLC	ACP II Marcellus LLC and Carrizo (Marcellus) LLC		1460/1083	
	Carrizo (Marcellus) LLC and ACP II Marcellus LLC	PDC Mountaineer, LLC		1518/395	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
B [00004364]	O. Carl Morris and Rachel L. Morris, his wife; William T. Morris and Willa R. Morris, his wife; Mary Morris Warder and Willis E. Warder, her husband	Petroleum Development Corporation	12.50%	1018/107	122
	Petroleum Development Corporation	PDC Mountaineer, LLC		1474/612	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
C [00004966]	Mark V. Kuntz and Charles G. Johnson, as Co Attorneys-in-Fact for, Betty L. Thompson	PDC Mountaineer, LLC	15.00%	1475/861 1578/1257	39.25
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
C [00004967]	Jay D. Harmer, Married	PDC Mountaineer, LLC	15.00%	1475/1224 1578/1258	39.25
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
D, E [00003555]	Lydia Drainer, widow	Union Carbide Corporation	12.50%	853/91	380
	Union Carbide Corporation	Creslenn Oil Company		897/286	

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Attachment to WW-6A1, Pritt South 204

	Creslenn Oil Company	Delta Producing Corporation		925/629	
	Delta Producing Corporation	Petroleum Corporation of America		967/575 977/168	
	Petroleum Corporation of America	Petroleum Development Corporation		977/153	
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
F [00005712]	John Stewart, Blanche Stewart, Hollie Stewart	Union Drilling, Inc. and Allerton Miller	12.50%	1101/790 (Harrison) 71/432 (Barbour)	100
	Allerton Miller	Union Drilling, Inc.		98/11 (Barbour) 1107/1040 (Harrison) 88/259 (Barbour)	
	Union Drilling, Inc.	Equitable Resources Exploration, Inc.		1189/1209 (Harrison) 325/171 (Barbour)	
	Equitable Resources Exploration, Inc.	Equitable Resources Energy Company		1199/642 (Harrison) 328/171 (Barbour)	
	Equitable Resources Energy Company	Fuel Resources Production and Development, Inc.		116/81 (Barbour)	
	Fuel Resources Production and Development Company, Inc.	The Houston Exploration Company		136/162 (Barbour) 383/187 (Barbour)	
	The Houston Exploration Company	Keyspan Natural Fuel, LLC.		1289/821	
	Keyspan Natural Fuel, LLC.	The Houston Exploration Company		1351/1260 (Harrison)	
	The Houston Exploration Company	Seneca-Upshur Petroleum, Inc.		1367/1084 (Harrison) 404/381 (Barbour) 139/48 (Barbour)	
	Seneca-Upshur Petroleum, Inc.	Seneca-Upshur Petroleum, LLC		1467/119 (Harrison) 59/1032 (Harrison) 447/129 (Barbour) 16/637 (Barbour)	

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Attachment to WW-6A1, Pritt South 204

G (00008032)	Jeffrey Craig Hinkle, a single man	Mar Key, LLC	13.00%	1604/1349	100
G (00007742)	Charles Kisner, a married man dealing in his sole and separate property	Mar Key, LLC	12.50%	1587/956	100
G (00005119)	William Michael Henline II	PDC Mountaineer, LLC	12.50%	1489/1030	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00008176)	Walter S. Flanigan, Jr. dealing in his sole and separate property	Mar Key, LLC	16.00%	1616/1127	100
G (00008035)	Michael Max Waldo, a married man dealing in his own right	Mar Key, LLC	13.00%	1606/709	100
G (00007795)	Paul W. Sturm, Jr. a/k/a Paul William Sturm, Jr., a single man	Mar Key, LLC	12.50%	1595/1300	100
G (00005122)	Diana Villare a/k/a Diane M. Dunn a/k/a Diana Murray	PDC Mountaineer, LLC	12.50%	1486/1178	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00005116)	Susan Lang Bauer	PDC Mountaineer, LLC	12.50%	1484/857	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00008173)	Dorrinda S. Flanigan, widow	Mar Key, LLC	16.00%	1616/1121	100
G (00005130)	James Morrison	PDC Mountaineer, LLC	12.50%	1499/246	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00005125)	Erma Phillips	PDC Mountaineer, LLC	12.50%	1488/1215	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	

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Attachment to WW-6A1, Pritt South 204

G (00005117)	Jennifer Morgan, a/k/a Jennifer Merritt	PDC Mountaineer, LLC	12.50%	1488/1212	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00005131)	Daniel W. Morrison	PDC Mountaineer, LLC	12.50%	1497/656	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00008174)	Tamra L. Rogers, dealing in her sole and separate property	Mar Key, LLC	16.00%	1616/1123	100
G (00005128)	Gay Ellen Preston a/k/a Ellen Preston	PDC Mountaineer, LLC	12.50%	1495/1058	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00008003)	Donna S. Marshall, fka Donna S. McElwain, a single woman	Mar Key, LLC	13.00%	1602/1186	100
G (00005123)	Chassidi Parker	PDC Mountaineer, LLC	12.50%	1488/1218	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00007817)	Joyce A. Moyer, a married woman dealing in her sole and separate property	Mar Key, LLC	15.00%	1597/346	100
G (00005129)	George Morrison	PDC Mountaineer, LLC	12.50%	1499/243	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00005126)	Thomas L. Morrison	PDC Mountaineer, LLC	12.50%	1489/1027	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	

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G (00007743)	Vietta A. Hawkins, a/k/a Vietta Fleming Hawkins, a married woman dealing in her sole and separate property	Mar Key, LLC	12.50%	1587/954	100
G (00005120)	Brian Morrison	PDC Mountaineer, LLC	12.50%	1486/1181	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00008269)	James Lee Horner, a single man	Mar Key, LLC	12.50%	1614/1084	100
G (00008175)	Walter R. Flanigan, dealing in his sole and separate property	Mar Key, LLC	12.50%	1616/1125	100
G (00005127)	George Ernest Grant	PDC Mountaineer, LLC	12.50%	1495/1061	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00008034)	Mark Lee Waldo, a married man dealing in his own right	Mar Key, LLC	13.00%	1606/707	100
G (00005121)	Ashley McElroy	PDC Mountaineer, LLC	12.50%	1489/1021	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00008161)	Lawrence A. Bowman, a widower	Mar Key, LLC	13.00%	1610/828	100
G (00005115)	Dianna Lynn Morrison	PDC Mountaineer, LLC	12.50%	1483/1347	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00008107)	Kimberly K. Twyman, married woman dealing in her own right	Mar Key, LLC	13.00%	1611/609	100
G (00005120)	George E. Morrison, Jr.	PDC Mountaineer, LLC	12.50%	1489/1024	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	

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G (00008072)	Judy Mae Holaway, f/k/a Judy Me Rodgers and Judy Rogers, a married woman dealing in her own right	Mar Key, LLC	13.00%	1606/329	100
G (00005118)	Gay Hayhurst a/k/a Gay Lorraine Cox a/k/a Gay Goodwin	PDC Mountaineer, LLC	12.50%	1486/1175	100
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00008440)	Robert B. Jones Jr., married man dealing in his own right	Mar Key, LLC	13.00%	1622/699	100
G (00008428)	Sharon Diane Criss, single	Mar Key, LLC	12.50%	1621/935	100
H (00008268)	Susan Shepard Starceвич, a married woman dealing in her own right	Mar Key, LLC	12.50%	180/292	21
H (00008324)	David Deutsch, a married man dealing in his own right	Mar Key, LLC	12.50%	180/583	21
H (00008210)	Jane Richardson D'Angelo, a married woman dealing in her own right	Mar Key, LLC	12.50%	179/523	21
H (00008211)	William B. Richardson, Jr., a married man dealing in his own right	Mar Key, LLC	12.50%	179/525	21
H (00008267)	Charles S. Kefover, Jr., a single man	Mar Key, LLC	12.50%	180/290	21
H (00008322)	The John A. Mosesso Credit Trust, by John Marshall Mosesso, trustee	Mar Key, LLC	12.50%	180/581	21
[00004307]	Mark V. Schumacher	Petroleum Development Corporation	12.50%	133/130	98.75
	Petroleum Development Corporation	PDC Mountaineer, LLC		150/444	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263 (Harrison)	

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33-05902400

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I [00004308]	The Empire National Bank of Clarksburg	Petroleum Development Corporation	12.50%	114/432	98.75
	Petroleum Development Corporation	PDC Mountaineer, LLC		150/444	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263 (Harrison)	
J,K [00008386]	The John A. Mosesso Credit Trust, by John Marshall Mosesso, trustee	Mar Key, LLC	13.50%	180/641	25.2277
L [00008374]	Liggett Farms, LLC	Mar Key, LLC	15.00%	180/623	25.2277
L (00008459)	Linda M. Simpson, widow	Mar Key, LLC	15.00%	unrecorded	25.2277
M & N [00005702]	Mildred Keck	Union Drilling, Inc.	12.50%	86/270	30
	Union Drilling, Inc.	Equitable Resources Exploration, Inc.		98/11	
	Equitable Resources Exploration, Inc.	Equitable Resources Energy Company		325/219	
	Equitable Resources Energy Company	Fuel Resources Production and Development, Inc.		328/171	
	Fuel Resources Production and Development, Inc.	The Houston Exploration Company		116/81	
	The Houston Exploration Company	Keyspan Natural Fuel, LLC.		132/230	
	Keyspan Natural Fuel, LLC.	The Houston Exploration Company		132/275	
	The Houston Exploration Company	Seneca-Upshur Petroleum, Inc.		383/187 (also 13/162)	
	Seneca-Upshur Petroleum, Inc.	Seneca-Upshur Petroleum, LLC.		138/1	
N [00005703]	Thomas D. Ferris and Mytle E. his wife	Union Drilling, Inc.	12.50%	86/202	10
	Union Drilling, Inc.	Equitable Resources Exploration, Inc.		98/11	

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Attachment to WW-6A1, Pritt South 204

	Equitable Resources Exploration, Inc.	Equitable Resources Energy Company		325/219	
	Equitable Resources Energy Company	Fuel Resources Production and Development, Inc.		328/171	
	Fuel Resources Production and Development, Inc.	The Houston Exploration Company		116/81	
	The Houston Exploration Company	Keyspan Natural Fuel, LLC.		132/230	
	Keyspan Natural Fuel, LLC.	The Houston Exploration Company		132/275	
	The Houston Exploration Company	Seneca-Upshur Petroleum, Inc.		383/187 (also 13/162)	
	Seneca-Upshur Petroleum, Inc.	Seneca-Upshur Petroleum, LLC.		138/1	
N [00005704]	Myrtle V Radcliffe	Allerton Miller and Union Drilling	12.50%	71/434	30
	Allerton Miller	Union Drilling, Inc.		98/11 (Barbour) 1107/1040 (Harrison) 88/259 (Barbour)	
	Union Drilling, Inc.	Equitable Resources Exploration, Inc.		1189/1209 (Harrison) 325/171 (Barbour)	
	Equitable Resources Exploration, Inc.	Equitable Resources Energy Company		1199/642 (Harrison) 328/171 (Barbour)	
	Equitable Resources Energy Company	Fuel Resources Production and Development, Inc.		116/81 (Barbour)	
	Fuel Resources Production and Development Company, Inc.	The Houston Exploration Company		136/162 (Barbour) 383/187 (Barbour)	
	The Houston Exploration Company	Keyspan Natural Fuel, LLC.		1289/821	
	Keyspan Natural Fuel, LLC.	The Houston Exploration Company		1351/1260 (Harrison)	
	The Houston Exploration Company	Seneca-Upshur Petroleum, Inc.		1367/1084 (Harrison) 404/381 (Barbour) 139/48 (Barbour)	

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33-05402 P101

Attachment to WW-6A1, Pritt South 204

	Seneca-Upshur Petroleum, Inc.	Seneca-Upshur Petroleum, LLC		1467/119 (Harrison) 59/1032 (Harrison) 447/129 (Barbour) 16/637 (Barbour)	
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Business and Licensing

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Business Organization Detail

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SENECA-UPSHUR PETROLEUM, LLC

Organization Information								
Org Type	Effective Date	Established Date	Filing Date	Charter	Class	Sec Type	Termination Date	Termination Reason
LLC Limited Liability Company	2/12/1973		2/12/1973	Domestic	Profit			

Organization Information			
Business Purpose	2111 - Mining, Quarrying, Oil & Gas Extraction - Oil and Gas Extraction - Crude Oil and Natural Gas Extraction		Capital Stock
Charter County		Control Number	0
Charter State	WV	Excess Acres	0
At Will Term	A	Member Managed	MBR
At Will Term Years		Par Value	
Authorized Shares			

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Addresses	
Type	Address
Designated Office Address	65 PROFESSIONAL PLACE SUITE 200 BRIDGEPORT, WV, 26330
Mailing Address	6031 WALLACE ROAD EXTENSION SUITE 300 WEXFORD, PA, 15090 USA
Notice of Process Address	CORPORATION SERVICE COMPANY 209 WEST WASHINGTON STREET CHARLESTON, WV, 25302
Principal Office Address	6031 WALLACE ROAD EXTENSION SUITE 300 WEXFORD, PA, 15090 USA
Type	Address

Officers	
Type	Name/Address
Member	RIVER RIDGE ENERGY, LLC 6031 WALLACE ROAD EXTENSION, SUITE 300 WEXFORD, PA, 15090
Organizer	TAMMY J OWEN 300 SUMMERS STREET, STE 1500 PO BOX 2107 CHARLESTON, WV, 25328 USA
Type	Name/Address

DBA			
DBA Name	Description	Effective Date	Termination Date
KEYSPAN PRODUCTION & DEVELOPMENT COMPANY	TRADENAME	6/11/2004	
NATIONAL GRID	TRADENAME	8/17/2007	
NATIONAL GRID PRODUCTION AND DEVELOPMENT	TRADENAME	12/5/2008	5/9/2012
DBA Name	Description	Effective Date	Termination Date

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Date	Old Name
3/28/2011	SENECA-UPSHUR PETROLEUM, INC.
Date	Old Name

Date	Amendment
6/15/2016	AMENDMENT FILED CHANGING FROM A MANAGER-MANAGED CO. TO A MEMBER-MANAGED CO. >> REMOVED ROBERT KOZEL & STEPHEN A. BISHOP AS MANAGERS & ADDED SOLE MEMBER (C IMAGE).
3/28/2011	CONVERSION: FROM SENECA-UPSHUR PETROLEUM, INC. TO SENECA-UPSHUR PETROLEUM, LLC
7/25/1997	MERGER; MERGING LITTLE SWISS DRILLING COMPANY, A QUAL WV CORP AND PALACE VALLEY PETROLEUM COMPANY, A QUAL WV CORP WITH AND INTO SENECA-UPSHUR PETROLEUM, INC., A QUAL WV CORP, THE SURVIVOR.
Date	Amendment

Annual Reports
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1999
1998
Date filed

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Wednesday, July 18, 2018 — 1:13 PM

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MAR KEY LLC

Organization Information									
Org Type	Effective Date	Established Date	Filing Date	Charter	Class	Sec Type	Termination Date	Termination Reason	
LLC Limited Liability Company	7/11/2011		7/11/2011	Domestic	Profit				

Organization Information									
Business Purpose	2111 - Mining, Quarrying, Oil & Gas Extraction - Oil and Gas Extraction - Crude Oil and Natural Gas Extraction			Capital Stock					
Charter County				Control Number	99Q1F				
Charter State	WV			Excess Acres					
At Will Term	A			Member Managed	MBR				
At Will Term Years				Par Value					

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Authorized Shares

Addresses	
Type	Address
Designated Office Address	65 PROFESSIONAL PLACE SUITE 200 BRIDGEPORT, WV, 26330
Mailing Address	6031 WALLACE ROAD EXTENSION SUITE 300 WEXFORD, PA, 15090 USA
Notice of Process Address	CORPORATION SERVICE COMPANY 209 WEST WASHINGTON STREET CHARLESTON, WV, 25302
Principal Office Address	6031 WALLACE ROAD EXTENSION SUITE 300 WEXFORD, PA, 15090 USA
Type	Address

Officers	
Type	Name/Address
Member	ARSENAL RESOURCES ENERGY LLC 6031 WALLACE ROAD EXTENSION SUITE 300 WEXFORD, PA, 15090
Organizer	PAUL M HERZING 560 EPSILON DR. PITTSBURGH, PA, 15238 USA
Type	Name/Address

Annual Reports
Date filed

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3/30/2017
6/20/2016
6/30/2015
4/28/2014
6/28/2013
5/8/2012
Date filed

For more information, please contact the Secretary of State's Office at 304-558-8000.

Tuesday, November 28, 2017 — 9:44 AM

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Agreement to Drill, Complete and Operate Oil & Gas Wells

This Agreement to Drill, Complete and Operate Oil & Gas Wells (this "Agreement"), by and among Mountaineer Keystone LLC, a West Virginia limited liability company ("Mountaineer Keystone"), PDC Mountaineer, LLC, a Delaware limited liability company ("PDC"), and PDC Mountaineer Holdings, LLC, a Delaware limited liability company ("PDC Holdings"), is effective as of October 15, 2014. (the "Effective Date") and sets forth the terms pursuant to which Mountaineer Keystone will drill, complete and operate the Wells (as defined below) on behalf of PDC and PDC Holdings. Mountaineer Keystone, PDC, and PDC Holdings are each a "Party" and are collectively the "Parties". In consideration of the foregoing and the respective agreements hereinafter set forth and the mutual benefits to be derived therefrom, the Parties, intending to be legally bound, hereby agree as follows:

1. **Term:** This Agreement is effective from the Effective Date until terminated by Mountaineer Keystone on the one hand or PDC and PDC Holdings on the other hand with 30 days' written notice to the other Party or Parties, as applicable (the "Term").
2. **Authorization to Operate:** PDC and PDC Holdings authorize Mountaineer Keystone to undertake and perform, on PDC and PDC Holdings behalf, all operations, including without limitation permit applications, well pad preparation, drilling and completing wells, and marketing gas, oil and other hydrocarbons therefrom with respect to all oil and gas wells to be drilled on oil and gas leasehold acreage held by PDC or PDC Holdings. PDC, PDC Holdings and Mountaineer Keystone are affiliates with a common parent. Mountaineer Keystone was formed to operate oil and gas leasehold acreage held by PDC, PDC Holdings and certain other affiliates. Mountaineer Keystone agrees that it shall, in a good and workmanlike manner and in accordance with industry standards as they prevail in the area, drill, complete and operate oil and gas wells on leasehold acreage owned by PDC or PDC Holdings from time to time as directed by PDC or PDC Holdings (collectively, the "Wells").
3. **No Third Party Beneficiary:** This Agreement is for the benefit of the Parties and is not for the benefit of any third party.
4. **Counterparts:** This Agreement may be simultaneously executed in several counterparts and via facsimile or similar electronic transmittal, each of which shall be deemed to be an original and taken together shall constitute one and the same instrument.

[Signature Page Follows]


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IN WITNESS WHEREOF, Mountaineer Keystone, PDC, and PDC Holdings have caused their
duly authorized representatives to execute this Agreement as of the Effective Date.

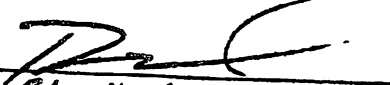
MOUNTAINEER KEYSTONE LLC

By: 
Name: Robert Kesel
Title: CEO

PDC MOUNTAINEER, LLC

By: 
Name: Robert Kesel
Title: CEO

PDC MOUNTAINEER HOLDINGS, LLC

By: 
Name: Robert Kesel
Title: CEO

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Agreement to Drill, Complete and Operate Oil & Gas Wells

This Agreement to Drill, Complete and Operate Oil & Gas Wells (this "Agreement"), by and among Arsenal Resources LLC, a West Virginia limited liability company ("Arsenal"), River Ridge Energy, LLC, a Delaware limited liability company ("River Ridge"), and River Ridge Energy, Holdings, LLC, a Delaware limited liability company ("River Ridge Holdings"), is effective as of March 1, 2017. (the "Effective Date") and sets forth the terms pursuant to which Arsenal will drill, complete and operate the Wells (as defined below) on behalf of River Ridge and River Ridge Holdings. Arsenal, River Ridge, and River Ridge Holdings are each a "Party" and are collectively the "Parties". In consideration of the foregoing and the respective agreements hereinafter set forth and the mutual benefits to be derived therefrom, the Parties, intending to be legally bound, hereby agree as follows:

1. **Term:** This Agreement is effective from the Effective Date until terminated by Arsenal on the one hand or River Ridge and River Ridge Holdings on the other hand with 30 days' written notice to the other Party or Parties, as applicable (the "Term").
2. **Authorization to Operate:** River Ridge and River Holdings authorize Arsenal to undertake and perform, on River Ridge and River Ridge Holdings behalf, all operations, including without limitation permit applications, well pad preparation, drilling and completing wells, and marketing gas, oil and other hydrocarbons therefrom with respect to all oil and gas wells to be drilled on oil and gas leasehold acreage held by River Ridge or River Ridge Holdings. River Ridge, River Ridge Holdings and Arsenal are affiliates with a common parent. Arsenal was formed to operate oil and gas leasehold acreage held by River Ridge, River Ridge Holdings and certain other affiliates. Arsenal agrees that it shall, in a good and workmanlike manner and in accordance with industry standards as they prevail in the area, drill, complete and operate oil and gas wells on leasehold acreage owned by River Ridge or River Ridge Holdings from time to time as directed by River Ridge or River Ridge Holdings (collectively, the "Wells").
3. **No Third Party Beneficiary:** This Agreement is for the benefit of the Parties and is not for the benefit of any third party.
4. **Counterparts:** This Agreement may be simultaneously executed in several counterparts and via facsimile or similar electronic transmittal, each of which shall be deemed to be an original and taken together shall constitute one and the same instrument.

[Signature Page Follows]

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IN WITNESS WHEREOF, Arsenal, River Ridge, and River Ridge Holdings have caused their duly authorized representatives to execute this Agreement as of the Effective Date.

ARSENAL RESOURCES LLC

By: Joel E. Symonds
Name: Joel E. Symonds
Title: Vice President - Land

RIVER RIDGE ENERGY, LLC

By: Joel E. Symonds
Name: Joel E. Symonds
Title: Vice President - Land

RIVER RIDGE HOLDINGS, LLC

By: Joel E. Symonds
Name: Joel E. Symonds
Title: Vice President - Land

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People Powered. Asset Strong.

March 22, 2018

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

RE: Ownership of Roadways; Pritt South Pad

Dear Mr. Martin:

In preparation of filing a permit application for the above referenced well, the Title Department of Arsenal Resources has conducted a thorough title examination in order to determine the ownership of the oil and gas underlying all roadways crossed by the proposed wells. The findings of the title examination show that some of the roadways crossed by the proposed wells are owned in fee by the West Virginia Department of Transportation, Division of Highways and that some are only right of ways. If owned in fee by the West Virginia Department of Transportation, Division of Highways, a lease covering its interest in the roadway or roadways has been properly obtained and provided in the application materials. If a right of way only, the oil and gas underlying such roadway or roadways is owned by the adjoining landowners and is also covered by the leaseholds provided in the application materials.

If you have any questions, concerns or need further information, please do not hesitate to contact me at the address listed below.

Sincerely,

A handwritten signature in blue ink that reads 'Coty Brandon'.

Coty Brandon
Title Manager

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