



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 15, 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 212
47-033-05905-00-00

Modified lateral spacing and length

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

James A. Martin
Chief

Operator's Well Number: PRITT SOUTH 212
Farm Name: IRA & LAURA PRITT
U.S. WELL NUMBER: 47-033-05905-00-00
Horizontal 6A New Drill
Date Modification Issued: October 15, 2018

Promoting a healthy environment.

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

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

2) Operator's Well Number: Pritt South 212 Well Pad Name: Pritt South

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

4) Elevation, current ground: 1,352.60' Elevation, proposed post-construction: 1,354.80'

5) Well Type (a) Gas Oil Underground Storage

Other _____

(b) If Gas Shallow Deep

Horizontal

*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, 7799.0ft (TVD Heel) – 7799.0ft (TVD Toe), 100ft, 0.5 psi/ft Base of Marcellus Shale, 7899.0ft (TVD Heel) - 7899.0ft (TVD Toe)

8) Proposed Total Vertical Depth: 7,883 ft

9) Formation at Total Vertical Depth: Marcellus shale

10) Proposed Total Measured Depth: 15,438 ft

11) Proposed Horizontal Leg Length: 7,172 ft

12) Approximate Fresh Water Strata Depths: 15', 45', 90', 219', 257', 300', 315', 345', and 385' *

13) Method to Determine Fresh Water Depths: Offsetting wells reported water depths (033-00660, 033-00950, 033-00960, 033-00976, 033-00980, 033-03262)

14) Approximate Saltwater Depths: 1400'

15) Approximate Coal Seam Depths: Bakerstown 492', Brush Creek 591', Upper Freeport 652', Lower Freeport 712', Upper Kittanning 787', Middle Kittanning 847', Lower Kittanning 860'

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

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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	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	1,500	1,500	CTS
Production	5.5	New	P-110	20	15,438	15,438	TOC @ 1,350' MD
Tubing							
Liners							

** Best casing possible JA*

SDW 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% CaCl2	1.20
Fresh Water	13.375	17.5	0.38	2730	900	Class A, 3% CaCl2	1.20
Coal							
Intermediate	9.625	12.25	0.395	3950	1500	Class A, 3% CaCl2	1.29
Production	5.5	8.5-8.75	0.361	12,640	9,500	Class A/50:50 Poz	1.29/1.34
Tubing					5,000		
Liners					N/A		

PACKERS

Kind:				
Sizes:				
Depths Set:				

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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.

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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 until we reach the vertical section of the well.

WV Department of Environmental Protection

*Note: Attach additional sheets as needed.



ARSENAL
R E S O U R C E S

Arsenal Resources

Harrison County, West Virginia NAD 83

Pritt South Pad

Pritt South #212

Wellbore #1

Plan: Design #3

QES Well Planning Report

26 June, 2018

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DIRECTIONAL DRILLING

33-05905 Mon



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Pritt South #212
Company:	Arsenal Resources	TVD Reference:	WELL @ 1381.8usft
Project:	Harrison County, West Virginia NAD 83	MD Reference:	WELL @ 1381.8usft
Site:	Pritt South Pad	North Reference:	Grid
Well:	Pritt South #212	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

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

Well	Pritt South #212					
Well Position	+N/-S	-373.4 usft	Northing:	271,995.88 usft	Latitude:	39° 14' 41.045 N
	+E/-W	139.2 usft	Easting:	1,774,058.02 usft	Longitude:	80° 11' 11.617 W
Position Uncertainty	0.0 usft		Wellhead Elevation:	0.0 usft	Ground Level:	1,354.8 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	51,826.43288905

Design	Design #3				
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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	338.84

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	
2,911.1	8.22	236.59	2,909.7	-16.2	-24.6	2.00	2.00	0.00	236.59	
4,609.1	8.22	236.59	4,590.3	-149.9	-227.3	0.00	0.00	0.00	0.00	
5,020.3	0.00	360.00	5,000.0	-166.2	-251.9	2.00	-2.00	0.00	180.00	VP Pritt South #212
7,266.5	0.00	360.00	7,246.2	-166.2	-251.9	0.00	0.00	0.00	360.00	
8,266.5	90.00	341.00	7,882.8	435.8	-459.1	9.00	9.00	-1.90	341.00	
15,438.0	90.00	341.00	7,882.8	7,216.7	-2,793.6	0.00	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 #212
Company:	Arsenal Resources	TVD Reference:	WELL @ 1381.8usft
Project:	Harrison County, West Virginia NAD 83	MD Reference:	WELL @ 1381.8usft
Site:	Pritt South Pad	North Reference:	Grid
Well:	Pritt South #212	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

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	
100.0	0.00	0.00	100.0	0.0	0.0	0.0	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	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	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	
500.0	0.00	0.00	500.0	0.0	0.0	0.0	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	
700.0	0.00	0.00	700.0	0.0	0.0	0.0	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	
900.0	0.00	0.00	900.0	0.0	0.0	0.0	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	
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	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	
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	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	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	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	
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	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	
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	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	
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	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	
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	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	
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	
2,600.0	2.00	236.59	2,600.0	-1.0	-1.5	-0.4	2.00	2.00	0.00	
2,700.0	4.00	236.59	2,699.8	-3.8	-5.8	-1.5	2.00	2.00	0.00	
2,800.0	6.00	236.59	2,799.5	-8.6	-13.1	-3.3	2.00	2.00	0.00	
2,900.0	8.00	236.59	2,898.7	-15.4	-23.3	-5.9	2.00	2.00	0.00	
Start 1698.0 hold at 2911.1 MD										
2,911.1	8.22	236.59	2,909.7	-16.2	-24.6	-6.2	2.00	2.00	0.00	
3,000.0	8.22	236.59	2,997.7	-23.2	-35.2	-8.9	0.00	0.00	0.00	
3,100.0	8.22	236.59	3,096.6	-31.1	-47.1	-12.0	0.00	0.00	0.00	
3,200.0	8.22	236.59	3,195.6	-39.0	-59.1	-15.0	0.00	0.00	0.00	
3,300.0	8.22	236.59	3,294.6	-46.8	-71.0	-18.1	0.00	0.00	0.00	
3,400.0	8.22	236.59	3,393.6	-54.7	-82.9	-21.1	0.00	0.00	0.00	
3,500.0	8.22	236.59	3,492.5	-62.6	-94.9	-24.1	0.00	0.00	0.00	
3,600.0	8.22	236.59	3,591.5	-70.5	-106.8	-27.2	0.00	0.00	0.00	
3,700.0	8.22	236.59	3,690.5	-78.3	-118.8	-30.2	0.00	0.00	0.00	
3,800.0	8.22	236.59	3,789.5	-86.2	-130.7	-33.2	0.00	0.00	0.00	
3,900.0	8.22	236.59	3,888.4	-94.1	-142.6	-36.3	0.00	0.00	0.00	
4,000.0	8.22	236.59	3,987.4	-102.0	-154.6	-39.3	0.00	0.00	0.00	
4,100.0	8.22	236.59	4,086.4	-109.9	-166.5	-42.3	0.00	0.00	0.00	
4,200.0	8.22	236.59	4,185.3	-117.7	-178.5	-45.4	0.00	0.00	0.00	
4,300.0	8.22	236.59	4,284.3	-125.6	-190.4	-48.4	0.00	0.00	0.00	
4,400.0	8.22	236.59	4,383.3	-133.5	-202.3	-51.4	0.00	0.00	0.00	
4,500.0	8.22	236.59	4,482.3	-141.4	-214.3	-54.5	0.00	0.00	0.00	
Start Drop -2.00										
4,609.1	8.22	236.59	4,590.3	-149.9	-227.3	-57.8	0.00	0.00	0.00	
4,700.0	6.41	236.59	4,680.4	-156.3	-237.0	-60.2	2.00	-2.00	0.00	
4,800.0	4.41	236.59	4,779.9	-161.5	-244.8	-62.2	2.00	-2.00	0.00	

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Well Planning Report



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Well:	Pritt South #212	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

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)	
4,900.0	2.41	236.59	4,879.8	-164.8	-249.8	-63.5	2.00	-2.00	0.00	
5,000.0	0.41	236.59	4,979.7	-166.1	-251.8	-64.0	2.00	-2.00	0.00	
Start 2246.2 hold at 5020.3 MD										
5,020.3	0.00	360.00	5,000.0	-166.2	-251.9	-64.0	2.00	-2.00	0.00	
5,100.0	0.00	0.00	5,079.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
5,200.0	0.00	0.00	5,179.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
5,300.0	0.00	0.00	5,279.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
5,400.0	0.00	0.00	5,379.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
5,500.0	0.00	0.00	5,479.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
5,600.0	0.00	0.00	5,579.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
5,700.0	0.00	0.00	5,679.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
5,800.0	0.00	0.00	5,779.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
5,900.0	0.00	0.00	5,879.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
6,000.0	0.00	0.00	5,979.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
6,100.0	0.00	0.00	6,079.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
6,200.0	0.00	0.00	6,179.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
6,300.0	0.00	0.00	6,279.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
6,400.0	0.00	0.00	6,379.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
6,500.0	0.00	0.00	6,479.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
6,600.0	0.00	0.00	6,579.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
6,700.0	0.00	0.00	6,679.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
6,800.0	0.00	0.00	6,779.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
6,900.0	0.00	0.00	6,879.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
7,000.0	0.00	0.00	6,979.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
7,100.0	0.00	0.00	7,079.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
7,200.0	0.00	0.00	7,179.7	-166.2	-251.9	-64.0	0.00	0.00	0.00	
Start DLS 9.00 TFO 341.00										
7,266.5	0.00	0.00	7,246.2	-166.2	-251.9	-64.0	0.00	0.00	0.00	
7,300.0	3.02	341.00	7,279.7	-165.3	-252.2	-63.2	9.00	9.00	0.00	
7,350.0	7.52	341.00	7,329.5	-161.0	-253.7	-58.6	9.00	9.00	0.00	
7,400.0	12.02	341.00	7,378.7	-153.0	-256.4	-50.1	9.00	9.00	0.00	
7,450.0	16.52	341.00	7,427.2	-141.3	-260.4	-37.8	9.00	9.00	0.00	
7,500.0	21.02	341.00	7,474.5	-126.1	-265.7	-21.7	9.00	9.00	0.00	
7,550.0	25.52	341.00	7,520.4	-107.5	-272.1	-2.0	9.00	9.00	0.00	
7,600.0	30.02	341.00	7,564.7	-85.4	-279.7	21.3	9.00	9.00	0.00	
7,650.0	34.52	341.00	7,606.9	-60.2	-288.4	48.0	9.00	9.00	0.00	
7,700.0	39.02	341.00	7,647.0	-31.9	-298.1	77.9	9.00	9.00	0.00	
7,750.0	43.52	341.00	7,684.6	-0.7	-308.8	110.8	9.00	9.00	0.00	
7,800.0	48.02	341.00	7,719.4	33.1	-320.5	146.6	9.00	9.00	0.00	
7,850.0	52.52	341.00	7,751.4	69.5	-333.0	185.0	9.00	9.00	0.00	
7,900.0	57.02	341.00	7,780.2	108.1	-346.3	225.8	9.00	9.00	0.00	
7,950.0	61.52	341.00	7,805.8	148.7	-360.3	268.7	9.00	9.00	0.00	
8,000.0	66.02	341.00	7,827.9	191.1	-374.9	313.6	9.00	9.00	0.00	
8,050.0	70.52	341.00	7,846.4	235.0	-390.0	360.0	9.00	9.00	0.00	
8,100.0	75.02	341.00	7,861.2	280.2	-405.5	407.7	9.00	9.00	0.00	
8,150.0	79.52	341.00	7,872.2	326.3	-421.4	456.4	9.00	9.00	0.00	
8,200.0	84.02	341.00	7,879.4	373.0	-437.5	505.8	9.00	9.00	0.00	
8,250.0	88.52	341.00	7,882.6	420.2	-453.8	555.7	9.00	9.00	0.00	
Start 7171.6 hold at 8266.5 MD										
8,266.5	90.00	341.00	7,882.8	435.8	-459.1	572.1	9.00	9.00	0.00	
8,300.0	90.00	341.00	7,882.8	467.5	-470.0	605.6	0.00	0.00	0.00	
8,400.0	90.00	341.00	7,882.8	562.0	-502.6	705.6	0.00	0.00	0.00	
8,500.0	90.00	341.00	7,882.8	656.6	-535.1	805.5	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 #212
Company:	Arsenal Resources	TVD Reference:	WELL @ 1381.8usft
Project:	Harrison County, West Virginia NAD 83	MD Reference:	WELL @ 1381.8usft
Site:	Pritt South Pad	North Reference:	Grid
Well:	Pritt South #212	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

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)
8,600.0	90.00	341.00	7,882.8	751.1	-567.7	905.4	0.00	0.00	0.00
8,700.0	90.00	341.00	7,882.8	845.7	-600.2	1,005.3	0.00	0.00	0.00
8,800.0	90.00	341.00	7,882.8	940.2	-632.8	1,105.3	0.00	0.00	0.00
8,900.0	90.00	341.00	7,882.8	1,034.8	-665.3	1,205.2	0.00	0.00	0.00
9,000.0	90.00	341.00	7,882.8	1,129.4	-697.9	1,305.1	0.00	0.00	0.00
9,100.0	90.00	341.00	7,882.8	1,223.9	-730.4	1,405.1	0.00	0.00	0.00
9,200.0	90.00	341.00	7,882.8	1,318.5	-763.0	1,505.0	0.00	0.00	0.00
9,300.0	90.00	341.00	7,882.8	1,413.0	-795.5	1,604.9	0.00	0.00	0.00
9,400.0	90.00	341.00	7,882.8	1,507.6	-828.1	1,704.8	0.00	0.00	0.00
9,500.0	90.00	341.00	7,882.8	1,602.1	-860.6	1,804.8	0.00	0.00	0.00
9,600.0	90.00	341.00	7,882.8	1,696.7	-893.2	1,904.7	0.00	0.00	0.00
9,700.0	90.00	341.00	7,882.8	1,791.2	-925.7	2,004.6	0.00	0.00	0.00
9,800.0	90.00	341.00	7,882.8	1,885.8	-958.3	2,104.6	0.00	0.00	0.00
9,900.0	90.00	341.00	7,882.8	1,980.3	-990.9	2,204.5	0.00	0.00	0.00
10,000.0	90.00	341.00	7,882.8	2,074.9	-1,023.4	2,304.4	0.00	0.00	0.00
10,100.0	90.00	341.00	7,882.8	2,169.4	-1,056.0	2,404.3	0.00	0.00	0.00
10,200.0	90.00	341.00	7,882.8	2,264.0	-1,088.5	2,504.3	0.00	0.00	0.00
10,300.0	90.00	341.00	7,882.8	2,358.6	-1,121.1	2,604.2	0.00	0.00	0.00
10,400.0	90.00	341.00	7,882.8	2,453.1	-1,153.6	2,704.1	0.00	0.00	0.00
10,500.0	90.00	341.00	7,882.8	2,547.7	-1,186.2	2,804.1	0.00	0.00	0.00
10,600.0	90.00	341.00	7,882.8	2,642.2	-1,218.7	2,904.0	0.00	0.00	0.00
10,700.0	90.00	341.00	7,882.8	2,736.8	-1,251.3	3,003.9	0.00	0.00	0.00
10,800.0	90.00	341.00	7,882.8	2,831.3	-1,283.8	3,103.8	0.00	0.00	0.00
10,900.0	90.00	341.00	7,882.8	2,925.9	-1,316.4	3,203.8	0.00	0.00	0.00
11,000.0	90.00	341.00	7,882.8	3,020.4	-1,348.9	3,303.7	0.00	0.00	0.00
11,100.0	90.00	341.00	7,882.8	3,115.0	-1,381.5	3,403.6	0.00	0.00	0.00
11,200.0	90.00	341.00	7,882.8	3,209.5	-1,414.0	3,503.6	0.00	0.00	0.00
11,300.0	90.00	341.00	7,882.8	3,304.1	-1,446.6	3,603.5	0.00	0.00	0.00
11,400.0	90.00	341.00	7,882.8	3,398.6	-1,479.1	3,703.4	0.00	0.00	0.00
11,500.0	90.00	341.00	7,882.8	3,493.2	-1,511.7	3,803.3	0.00	0.00	0.00
11,600.0	90.00	341.00	7,882.8	3,587.7	-1,544.2	3,903.3	0.00	0.00	0.00
11,700.0	90.00	341.00	7,882.8	3,682.3	-1,576.8	4,003.2	0.00	0.00	0.00
11,800.0	90.00	341.00	7,882.8	3,776.9	-1,609.3	4,103.1	0.00	0.00	0.00
11,900.0	90.00	341.00	7,882.8	3,871.4	-1,641.9	4,203.1	0.00	0.00	0.00
12,000.0	90.00	341.00	7,882.8	3,966.0	-1,674.4	4,303.0	0.00	0.00	0.00
12,100.0	90.00	341.00	7,882.8	4,060.5	-1,707.0	4,402.9	0.00	0.00	0.00
12,200.0	90.00	341.00	7,882.8	4,155.1	-1,739.5	4,502.8	0.00	0.00	0.00
12,300.0	90.00	341.00	7,882.8	4,249.6	-1,772.1	4,602.8	0.00	0.00	0.00
12,400.0	90.00	341.00	7,882.8	4,344.2	-1,804.6	4,702.7	0.00	0.00	0.00
12,500.0	90.00	341.00	7,882.8	4,438.7	-1,837.2	4,802.6	0.00	0.00	0.00
12,600.0	90.00	341.00	7,882.8	4,533.3	-1,869.7	4,902.6	0.00	0.00	0.00
12,700.0	90.00	341.00	7,882.8	4,627.8	-1,902.3	5,002.5	0.00	0.00	0.00
12,800.0	90.00	341.00	7,882.8	4,722.4	-1,934.8	5,102.4	0.00	0.00	0.00
12,900.0	90.00	341.00	7,882.8	4,816.9	-1,967.4	5,202.3	0.00	0.00	0.00
13,000.0	90.00	341.00	7,882.8	4,911.5	-2,000.0	5,302.3	0.00	0.00	0.00
13,100.0	90.00	341.00	7,882.8	5,006.1	-2,032.5	5,402.2	0.00	0.00	0.00
13,200.0	90.00	341.00	7,882.8	5,100.6	-2,065.1	5,502.1	0.00	0.00	0.00
13,300.0	90.00	341.00	7,882.8	5,195.2	-2,097.6	5,602.1	0.00	0.00	0.00
13,400.0	90.00	341.00	7,882.8	5,289.7	-2,130.2	5,702.0	0.00	0.00	0.00
13,500.0	90.00	341.00	7,882.8	5,384.3	-2,162.7	5,801.9	0.00	0.00	0.00
13,600.0	90.00	341.00	7,882.8	5,478.8	-2,195.3	5,901.8	0.00	0.00	0.00
13,700.0	90.00	341.00	7,882.8	5,573.4	-2,227.8	6,001.8	0.00	0.00	0.00
13,800.0	90.00	341.00	7,882.8	5,667.9	-2,260.4	6,101.7	0.00	0.00	0.00
13,900.0	90.00	341.00	7,882.8	5,762.5	-2,292.9	6,201.6	0.00	0.00	0.00

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33-05905100



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Pritt South #212
Company:	Arsenal Resources	TVD Reference:	WELL @ 1381.8usft
Project:	Harrison County, West Virginia NAD 83	MD Reference:	WELL @ 1381.8usft
Site:	Pritt South Pad	North Reference:	Grid
Well:	Pritt South #212	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

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)
14,000.0	90.00	341.00	7,882.8	5,857.0	-2,325.5	6,301.6	0.00	0.00	0.00
14,100.0	90.00	341.00	7,882.8	5,951.6	-2,358.0	6,401.5	0.00	0.00	0.00
14,200.0	90.00	341.00	7,882.8	6,046.1	-2,390.6	6,501.4	0.00	0.00	0.00
14,300.0	90.00	341.00	7,882.8	6,140.7	-2,423.1	6,601.4	0.00	0.00	0.00
14,400.0	90.00	341.00	7,882.8	6,235.2	-2,455.7	6,701.3	0.00	0.00	0.00
14,500.0	90.00	341.00	7,882.8	6,329.8	-2,488.2	6,801.2	0.00	0.00	0.00
14,600.0	90.00	341.00	7,882.8	6,424.4	-2,520.8	6,901.1	0.00	0.00	0.00
14,700.0	90.00	341.00	7,882.8	6,518.9	-2,553.3	7,001.1	0.00	0.00	0.00
14,800.0	90.00	341.00	7,882.8	6,613.5	-2,585.9	7,101.0	0.00	0.00	0.00
14,900.0	90.00	341.00	7,882.8	6,708.0	-2,618.4	7,200.9	0.00	0.00	0.00
15,000.0	90.00	341.00	7,882.8	6,802.6	-2,651.0	7,300.9	0.00	0.00	0.00
15,100.0	90.00	341.00	7,882.8	6,897.1	-2,683.5	7,400.8	0.00	0.00	0.00
15,200.0	90.00	341.00	7,882.8	6,991.7	-2,716.1	7,500.7	0.00	0.00	0.00
15,300.0	90.00	341.00	7,882.8	7,086.2	-2,748.6	7,600.6	0.00	0.00	0.00
15,400.0	90.00	341.00	7,882.8	7,180.8	-2,781.2	7,700.6	0.00	0.00	0.00
TD at 15438.0									
15,438.0	90.00	341.00	7,882.8	7,216.7	-2,793.6	7,738.6	0.00	0.00	0.00

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL Pritt South #21: - hit/miss target - Shape - Point	0.00	0.00	7,882.8	7,216.7	-2,793.6	279,212.63	1,771,264.45	39° 15' 52.161 N	80° 11' 47.837 W
LP Pritt South #212 D - plan hits target center - Point	0.00	0.00	7,882.8	435.8	-459.1	272,431.66	1,773,598.91	39° 14' 45.317 N	80° 11' 17.495 W

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
2,911.1	2,909.7	-16.2	-24.6	Start 1698.0 hold at 2911.1 MD
4,609.1	4,590.3	-149.9	-227.3	Start Drop -2.00
5,020.3	5,000.0	-166.2	-251.9	Start 2246.2 hold at 5020.3 MD
7,266.5	7,246.2	-166.2	-251.9	Start DLS 9.00 TFO 341.00
8,266.5	7,882.8	435.8	-459.1	Start 7171.6 hold at 8266.5 MD
15,438.0	7,882.8	7,216.7	-2,793.6	TD at 15438.0

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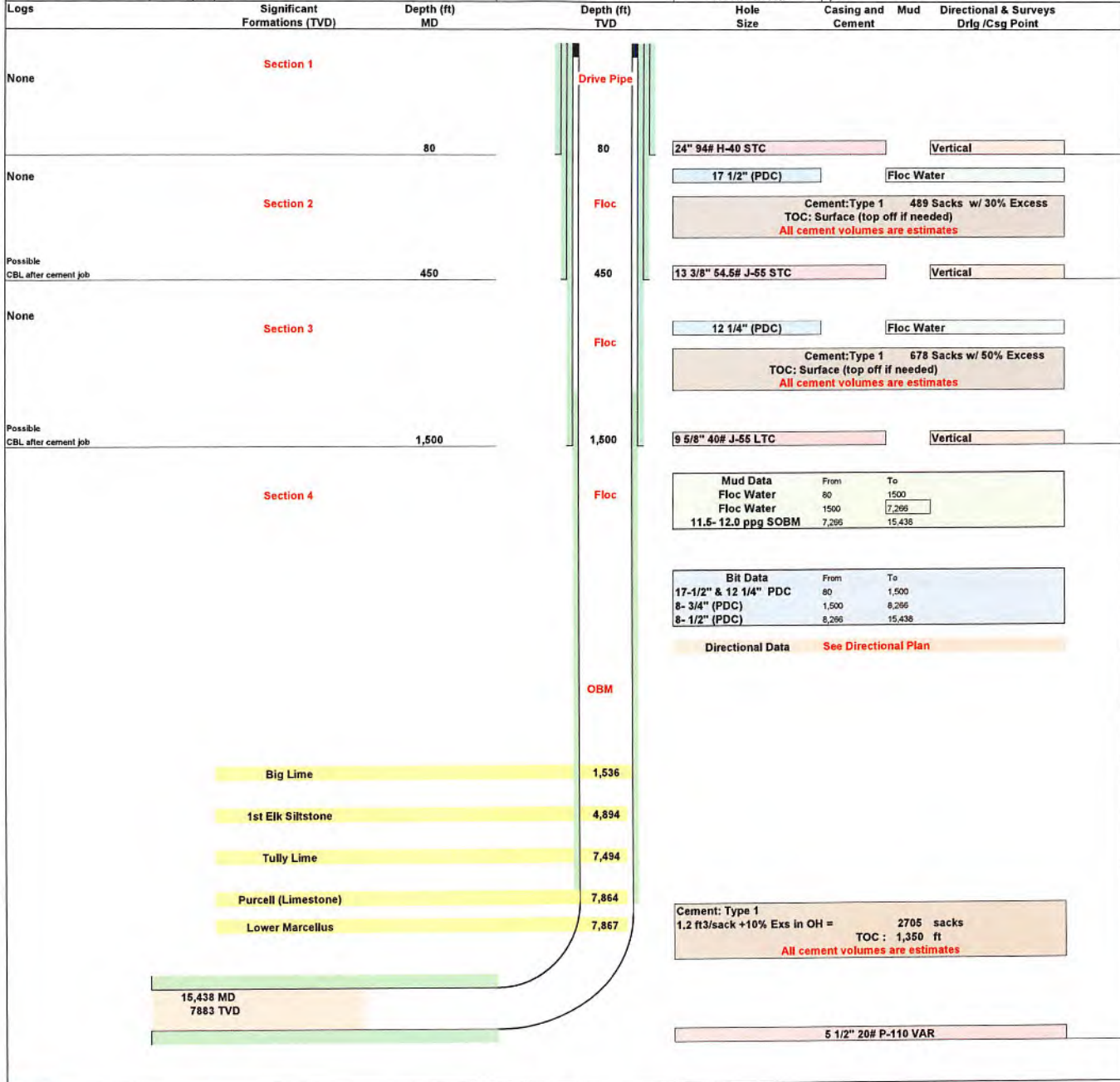
33-05905 MOD



Arsenal Resources
Pritt South 212
Casing Design
Directional Plan # 3 QES

Other Names:	N/A
Surface Location:	TBD
Bottom Hole Location:	TBD
Total Depth:	15,438 MD (ft) 7,883 TVD

County:	Harrison
State:	West Virginia
AFE #:	XX
RKB:	27
Ground Level:	1,354



Revision 1
 Note: Not drawn to scale
 Date Last Revised: 3-Jul-18
 Jarrett Toms
 Cement Outside Casing Seal Assembly in Annulus

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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 County, WV prior to hydraulic fracturing at the following Arsenal Resources wells on the Pritt South Pad, well 212.

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 Elk Sand formation (approximately 5,800' 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 proper 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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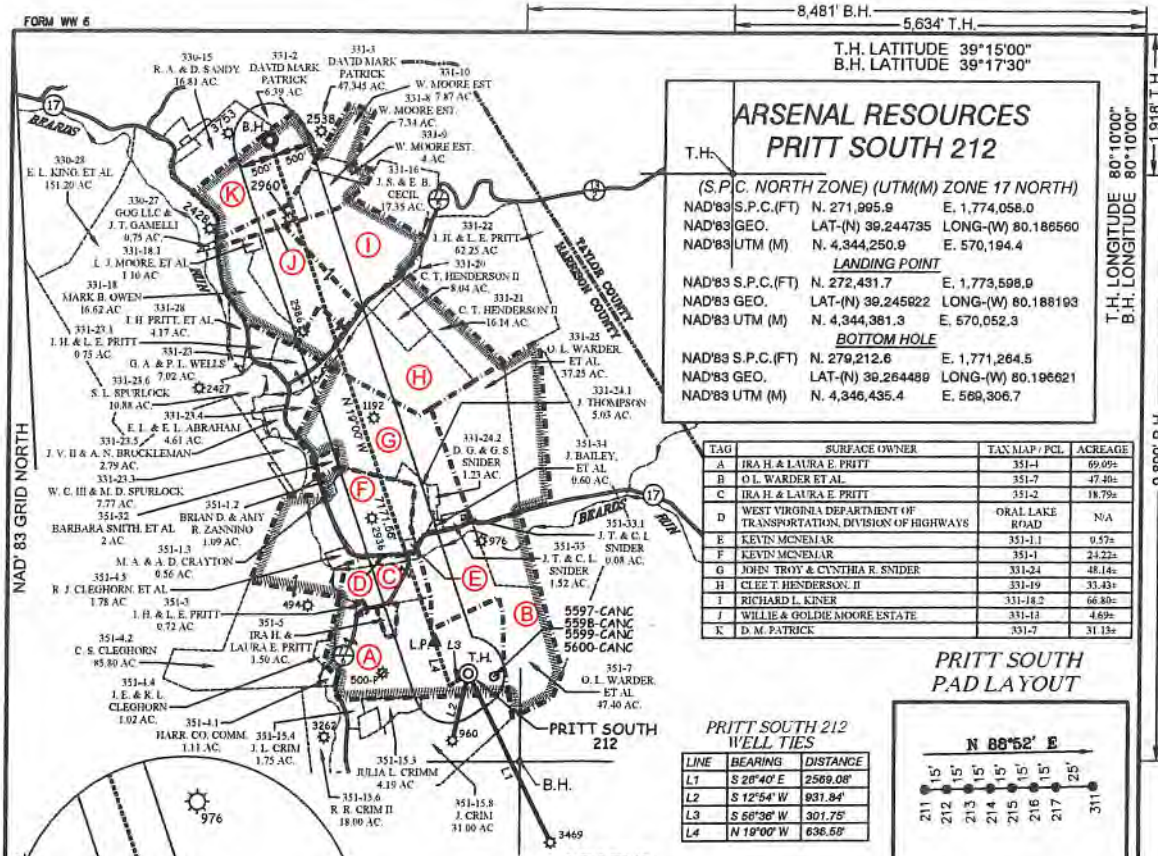
Area of Review Report - **Pritt South** Pad, **212** Lateral, **Harrison** County, WV

Well Name	API Number	Operator Name / Address	Well Type	Latitude	Longitude	Total Depth	Perforated Formation(s)	Producing Zones not Perforated
Glen H Smith H-42	033-02936	Tenmile Land, LLC	Existing	39.25048	-80.191228	5760	Riley, Benson, Elk	NA
Bernard F Joseph 2	033-02986	Alliance Petroleum Corp	Existing	39.257534	-80.194639	4487	Thirty-foot, Benson	NA
Frances Morris 1	033-01192	Alliance Petroleum Corp	Existing	39.253297	-80.191488	4994	Big Injun(Gmbr), Fifth, Benson	NA
Moore Heirs 1	033-02960	Alliance Petroleum Corp	Existing	39.26174	-80.195574	4602	Big Injun(Gmbr), Thirty-foot, Fourth, Balltown,Bradford, Riley, Benson	NA
Richard A Sandy 1	033-03753	CNX	Existing	39.26493	-80.198373	4536	Benson	NA

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AOR- Attachment "A"



**ARSENAL RESOURCES
PRITT SOUTH 212**

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

NAD'83 S.P.C.(FT) N. 271,995.9 E. 1,774,058.0
 NAD'83 GEO. LAT.(N) 39.244735 LONG.(W) 80.186560
 NAD'83 UTM (M) N. 4,344,250.9 E. 570,194.4

LANDING POINT

NAD'83 S.P.C.(FT) N. 272,431.7 E. 1,773,598.0
 NAD'83 GEO. LAT.(N) 39.245622 LONG.(W) 80.186193
 NAD'83 UTM (M) N. 4,344,381.3 E. 570,052.3

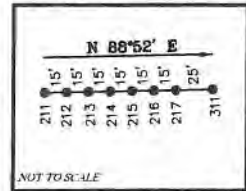
BOTTOM HOLE

NAD'83 S.P.C.(FT) N. 279,212.6 E. 1,771,264.5
 NAD'83 GEO. LAT.(N) 39.264489 LONG.(W) 80.196621
 NAD'83 UTM (M) N. 4,346,435.4 E. 569,306.7

TAG	SURFACE OWNER	TAX MAP / PCL.	ACREAGE
A	IRA H & LAURA E PRITT	351-4	69.09±
B	O L WARDER ET AL	351-7	47.40±
C	IRA H & LAURA E PRITT	351-2	18.79±
D	WEST VIRGINIA DEPARTMENT OF TRANSPORTATION, DIVISION OF HIGHWAYS	ORAL LAKE ROAD	N/A
E	KEVIN MCNEMAR	351-1	0.57±
F	KEVIN MCNEMAR	351-1	24.22±
G	JOHN TROY & CYNTHIA R. SNIDER	331-24	48.14±
H	CLEE T HENDERSON, II	331-19	33.43±
I	RICHARD L. KINER	331-18.2	66.80±
J	WILLIE & GOLDFE MOORE ESTATE	331-13	4.69±
K	D. M. PATRICK	351-7	31.13±

PRITT SOUTH 212 WELL TIES

LINE	BEARING	DISTANCE
L1	S 28°40' E	2589.08'
L2	S 12°54' W	831.84'
L3	S 68°38' W	307.75'
L4	N 19°00' W	636.68'

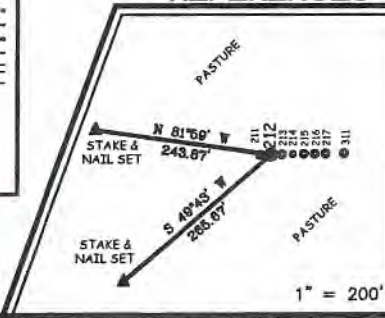


LEGEND

- LEASE LINE
- SURFACE LINE
- WELL LATERAL
- OFFSET LINE
- TIE LINE
- CREEK
- ROAD
- FENCE LINE
- COUNTY ROUTE
- STATE ROUTE
- PROPOSED WELL
- EXISTING WELL
- PERMITTED WELL
- LEASE TAG

NOTES ON SURVEY

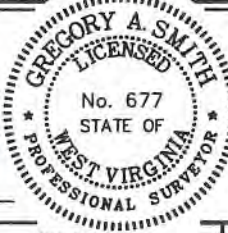
1. NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS > 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.



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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 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 21, 20 17
 REVISED AUGUST 15, 2018
 OPERATORS WELL NO. PRITT SOUTH 212
 API WELL NO. 47 - 033 - 05905
 STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8383P212R3.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 INJECTION WASTE DISPOSAL IF "GAS" PRODUCTION STORAGE DEEP SHALLOW

LOCATION: ELEVATION EXISTING: 1,352.60' / PROPOSED: 1,354.80' 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 92.06±
 PROPOSED WORK: LEASE NO. 00006622
 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 15,438' TMD / 7,883' 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

COUNTY NAME
 PERMIT
 ENVIRONMENTAL PROTECTION
 WV Department of
 Office of Oil and Gas
 AUG 20 2018
 RECEIVED
 Office of Oil and Gas



Click or tap to enter a date.

Alliance Petroleum Corporation
Address
State

RE: Click or tap here to enter text.

Dear Sir/Madam,

Arsenal Resources has developed a Marcellus pad, Pritt South Pad, well 212, 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 during the Quarter of 2018. 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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AOR - Attachment "B"



SITE SAFETY PLAN

Pritt South Pad, Well #212

911 Address:

3460 Green Valley Road

Bridgeport, WV 26330

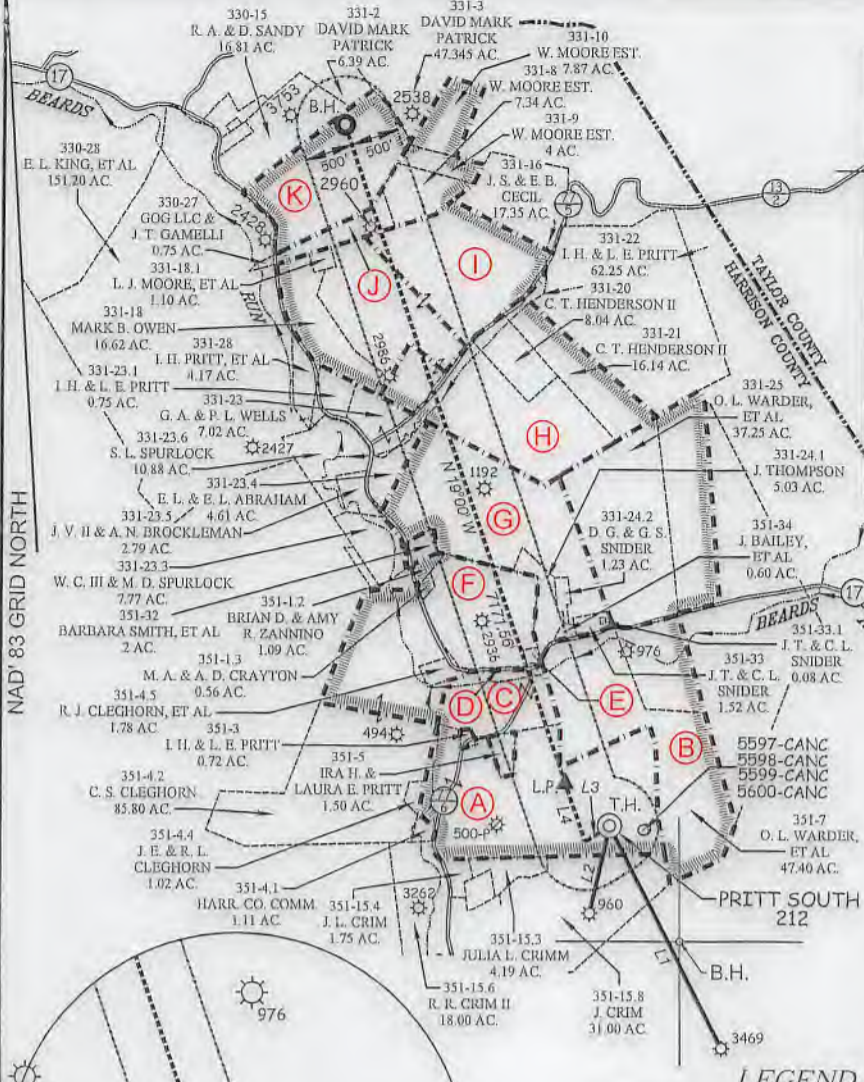
*SDW
8/15/2018*

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NAD '83 GRID NORTH

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

9,899' B.H.



ARSENAL RESOURCES PRITT SOUTH 212

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

NAD'83 S.P.C.(FT) N. 271,995.9 E. 1,774,058.0
 NAD'83 GEO. LAT(-N) 39.244735 LONG(-W) 80.186560
 NAD'83 UTM (M) N. 4,344,250.9 E. 570,194.4

LANDING POINT

NAD'83 S.P.C.(FT) N. 272,491.7 E. 1,773,598.9
 NAD'83 GEO. LAT(-N) 39.245922 LONG(-W) 80.188193
 NAD'83 UTM (M) N. 4,344,381.3 E. 570,052.3

BOTTOM HOLE

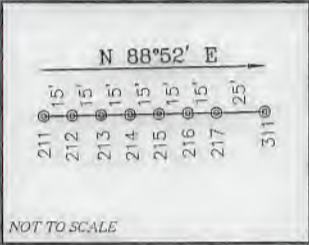
NAD'83 S.P.C.(FT) N. 279,212.6 E. 1,771,264.5
 NAD'83 GEO. LAT(-N) 39.264489 LONG(-W) 80.196621
 NAD'83 UTM (M) N. 4,346,435.4 E. 569,306.7

TAG	SURFACE OWNER	TAX MAP / PCL	ACREAGE
A	IRA H & LAURA E PRITT	351-4	69.09±
B	O.L. WARDER ET AL.	351-7	47.40±
C	IRA H & LAURA E PRITT	351-2	18.79±
D	WEST VIRGINIA DEPARTMENT OF TRANSPORTATION, DIVISION OF HIGHWAYS	ORAL LAKE ROAD	N/A
E	KEVIN MCNEMAR	351-1-1	0.57±
F	KEVIN MCNEMAR	351-1	24.22±
G	JOHN TROY & CYNTHIA R. SNIDER	331-24	48.14±
H	CLYDE T. HENDERSON, II	331-19	33.43±
I	RICHARD L. KINBR	331-18.2	66.80±
J	WILLIE & GOLDIE MOORE ESTATE	331-13	4.69±
K	D. M. PATRICK	331-7	31.13±

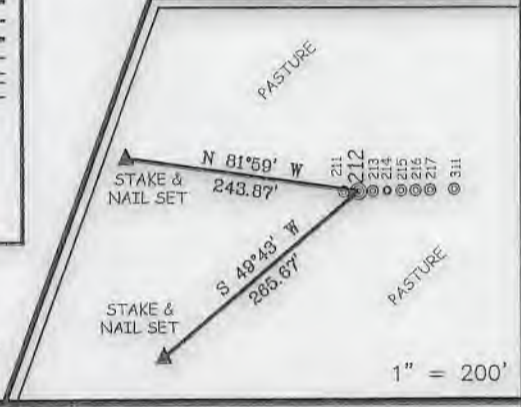
PRITT SOUTH PAD LAYOUT

PRITT SOUTH 212 WELL TIES

LINE	BEARING	DISTANCE
L1	S 26°40' E	2569.08'
L2	S 12°54' W	931.84'
L3	S 56°36' W	301.75'
L4	N 19°00' W	638.58'



REFERENCES



LEGEND

- LEASE LINE
- SURFACE LINE
- WELL LATERAL
- OFFSET LINE
- TIE LINE
- CREEK
- ROAD
- FENCE LINE
- COUNTY ROUTE
- STATE ROUTE
- PROPOSED WELL
- EXISTING WELL
- PERMITTED WELL
- LEASE TAG

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.



SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 • 12 Vanhorn Drive • Glenville, WV 26351 • (304) 462-6634
www.sissurveys.com

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 REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.

P.S. 677 *Gregory A. Smith*

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MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8383P212R3.dwg
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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: 1,352.60' / PROPOSED: 1,354.80' WATERSHED BEARDS RUN & PIGTAIL RUN
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 PHYSICAL CHANGE IN WELL (SPECIFY) TARGET FORMATION MARCELLUS
ESTIMATED DEPTH 15,438' TMD / 7,883' 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

COUNTY NAME PERMIT

WW-6A1
(5/13)

Operator's Well No. Pritt South 212

**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

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.

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Well Operator: Arsenal Resources
 By: William Veigel *William Veigel*
 Its: Designated Agent

33-05905 MOD

Attachment to WW-6A1, Pritt S 212

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
A, C ✓ (00006622)	Ira Pritt and Laura E. Pritt, husband and wife	Carrizo (Marcellus), LLC	15.00%	1448/804	92.06
	Carrizo (Marcellus), LLC	ACP II Marcellus, LLC and Carrizo (Marcellus) WV, LLC		1460/1083	
	Carrizo (Marcellus) WV, 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, and 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	
D ✓ (00007183)	West Virginia Department of Transportation, Division of Highways	Mar Key, LLC	20.00%	1568/1225	12.41
E, F ✓ (00004357)	Glen Smith and Helen Nadine Smith, his wife	Union Carbide Corporation	12.50%	853/131	60
	Union Carbide Corporation	Creslenn Oil Company		897/286	
	Creslenn Oil Company	Delta Producing Corporation		925/522	
	Delta Producing Corporation	Petroleum Corporation of America		967/575 (Also 977/168)	
	Petroleum Corporation of America	Petroleum Development Corporation		977/153	
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	

33-05905moo

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	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G ✓ (00004031)	Frances M. Morris, single and Lummie B. Snyder	Petroleum Development Corporation	12.50%	1058/166	58
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
H,I ✓ (00004184)	Bernard F. Joseph and Frenna J. Joseph, his wife	Petroleum Development Corporation	12.50%	1088/890	157
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
I ✓ (00004344)	Bernard F. Joseph and Frenna J. Joseph, his wife	Petroleum Development Corporation	12.50%	1134/87	41.14
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
I ✓ (00004345)	Robert M. Geer	Petroleum Development Corporation	12.50%	1140/701	41
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
I ✓ (00004346)	Thelma L. Randolf and Azel L. Randolf, her husband	Petroleum Development Corporation	12.50%	1075/811	41
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
I ✓ (00007845)	Janielle Elizabeth Williams, a single woman	Mar Key, LLC	12.50%	1599/318	37.78

33-05905 m00

I / (00007842)	Mark Rodney Nuzum, a married man dealing in his sole and separate property	Mar Key, LLC	12.50%	1597/404	
I / (00007846)	Terry Lewis Nuzum, a single man	Mar Key, LLC	12.50%	1598/1179	
J / (00003783)	Goldie Moore, widow	Petroleum Development Corporation	12.50%	1085/439	30
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
K / (00008144)	Jay D. Harmer, a married man dealing in his own right	Mar Key, LLC	12.50%	1607/409	32
K / (00008381)	JPMorgan Chase Bank, N.A., as Trustee Under a Trust Agreement Made by The Union National Bank of Clarksburg, a Corporation, and S.A. Smith and C. Burke Morris	Mar Key, LLC	20.00%	Unrecorded	32.125
K / (00008380)	JPMorgan Chase Bank, NA, Trustee for John W. Kerns Heirs Trust	Mar Key, LLC	20.00%	Unrecorded	32.125

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West Virginia Secretary of State — Online Data Services**Business and Licensing**

Online Data Services Help

Business Organization Detail

NOTICE: The West Virginia Secretary of State's Office makes every reasonable effort to ensure the accuracy of information. However, we make no representation or warranty as to the correctness or completeness of the information. If information is missing from this page, it is not in the The West Virginia Secretary of State's database.

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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WV Department of Environmental Protection

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

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Annual Reports
Date filed

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]

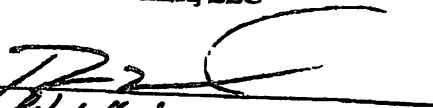
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IN WITNESS WHEREOF, Mountaineer Keystone, PDC, and PDC Holdings have caused their duly authorized representatives to execute this Agreement as of the Effective Date.

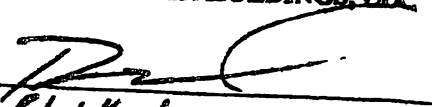
MOUNTAINEER KEYSTONE LLC

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.
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[Signature Page Follows]

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Office of Oil and Gas
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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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Environmental Protection

6031 Wallace Road Ext, Suite 300
Wexford, PA 15090
P: 724-940-1100
F: 800-428-0981
www.arsenalresources.com



August 17, 2018

WVDEP
Office of Oil and Gas
ATTN: Laura Adkins
601 57th Street SE
Charleston, WV 25304

RE: Pritt South Pad – Pritt South 212, API# 47-033-05905 – Modification to spacing changes and extending lateral

Dear Laura:

Enclosed please find the modification for the Pritt South 212, (API# 47-033-05905). This permit was on operator hold. We would like to remove the hold and replace it with this application. This permit is being modified due to adjusting the well bore spacing and moving it to 240' to the east. The well head locations remained the same. This well was originally permitted to 6,088.72'. We have obtained additional leasing for this site during this modification and request to extend the lateral 1,082.84' for a total of 7,171.56'. Included are the following:

- Plat
- WW-6B, Well Work Permit Application/Casing
- Well Bore Schematic
- WW-6A1, Lease Information
- Roadway Letter
- Site Safety Plan
- AOR

Should you have any questions or need any additional information, please feel free to contact me by phone or email. Thank you!

Sincerely,

A handwritten signature in blue ink that reads 'Kelly Davis'.

Kelly Davis
Permitting Specialist
1-304-517-8743 mobile
1-724-940-1218 office
kdavis@arsenalresources.com

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