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

Tuesday, May 7, 2019
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 214
47-033-05910-00-00

Revision for the TMD and TVD due to a change in anticipated thickness of formation.

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.

James A. Martin
Chief

Operator's Well Number: PRITT SOUTH 214
Farm Name: IRA & LAURA PRITT
U.S. WELL NUMBER: 47-033-05910-00-00
Horizontal 6A New Drill
Date Modification Issued: 05/07/2019

WW-6B
(04/15)

API NO. 47- 033 - 05910 05/10/2019
OPERATOR WELL NO. Pritt South 214
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	494519412	Harrison	Simpson	Brownton
		Operator ID	County	District	Quadrangle

2) Operator's Well Number: Pritt South 214 Well Pad Name: Pritt South

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

4) Elevation, current ground: 1,351.90' Elevation, proposed post-construction: 1,354.80'

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

SDW 3/12/2019

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale, 7654.0ft (TVD Heel) – 7654.0ft (TVD Toe), 90ft, 0.5 psi/ft Base of Marcellus Shale, 7744.0ft (TVD Heel) - 7744.0ft (TVD Toe)

8) Proposed Total Vertical Depth: 7,754 ft

9) Formation at Total Vertical Depth: Marcellus shale

10) Proposed Total Measured Depth: 17,916 ft

11) Proposed Horizontal Leg Length: 9,713 ft

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

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 X

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

Office RECEIVED
MAR 14 2019
WV Department of Environmental Protection

API NO. 47- 033 - 05910 05/10/2019
OPERATOR WELL NO. Pritt South 214
Well Pad Name: Pritt 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	1,500	1,500	CTS
Production	5.5	New	P-110	20	17,916	17,916	TOC @ 1,350' MD
Tubing							
Liners							

SDW
3/12/2019

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:				

API NO. 47- 033 - 05910 05/10/2019
OPERATOR WELL NO. Pritt South 214
Well Pad Name: Pritt South

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 ½" 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- ¼" intermediate hole to the programmed depth, run 9- 5/8" casing and cement to surface. The rig with then continue to drill an 8- ¾" hole to a designed KOP. We will then start drilling the curve and lateral section to the programmed total measured depth, run 5 ½" 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 ½" – 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 until we reach the vertical section of the well.

*Note: Attach additional sheets as needed.

05/10/2019

ARSENAL RESOURCES

Arsenal Resources
Pritt South 214
Casing Design
Directional Plan # 5 QES

Other Names:	N/A		County:	Harrison	
Surface Location:	TBD		State:	West Virginia	
Bottom Hole Location:	TBD		AFE #:	XX	API #: XX
Total Depth:	17,916 MD (ft)		RKB:	27	
	7,754 TVD		Ground Level:	1,354	

Logs	Significant Formations (TVD)	Depth (ft) MD	Depth (ft) TVD	Hole Size	Casing and Cement	Mud	Directional & Surveys Drlg /Csg Point
None	Section 1	80	80	24"	24" 94# H-40 STC		Vertical
None	Section 2		Floc	17 1/2" (PDC)	Cement: Class A 489 Sacks w/ 30% Excess TOC: Surface (top off if needed) All cement volumes are estimates	Floc Water	
Possible CBL after cement job		450	450		13 3/8" 54.5# J-55 STC		Vertical
None	Section 3		Floc	12 1/4" (PDC)	Cement: Class A 678 Sacks w/ 50% Excess TOC: Surface (top off if needed) All cement volumes are estimates	Floc Water	
Possible CBL after cement job		1,500	1,500		9 5/8" 40# J-55 LTC		Vertical
	Section 4		Floc				
	Big Lime		1,536				
	1st Elk Siltstone		4,894				
	Tully Lime		7,494				
	Purcell (Limestone)		7,864				
	Lower Marcellus		7,867				
			OBM				
		17,916 MD 7754 TVD			5 1/2" 20# P-110 VAR		

Mud Data	From	To
Floc Water	80	1500
Floc Water	1500	7,203
11.5- 12.0 ppg SOBM	7,203	17,916

Bit Data	From	To
17-1/2" & 12 1/4" PDC	80	1,500
8- 3/4" (PDC)	1,500	8,203
8- 1/2" (PDC)	8,203	17,916

Directional Data: See Directional Plan

Cement: Class A-50/50 POZ
1.2 ft3/sack +10% Exs in OH = 3178 sacks
TOC : 1,350 ft
All cement volumes are estimates

Revision 1

Note: Not drawn to scale

Cement Outside Casing
Seal Assembly in Annulus

Date Last Revised: 11-Mar-19
Jarrett Toms

FORM WW 6

8,458 B.H.
5,604' T.H.

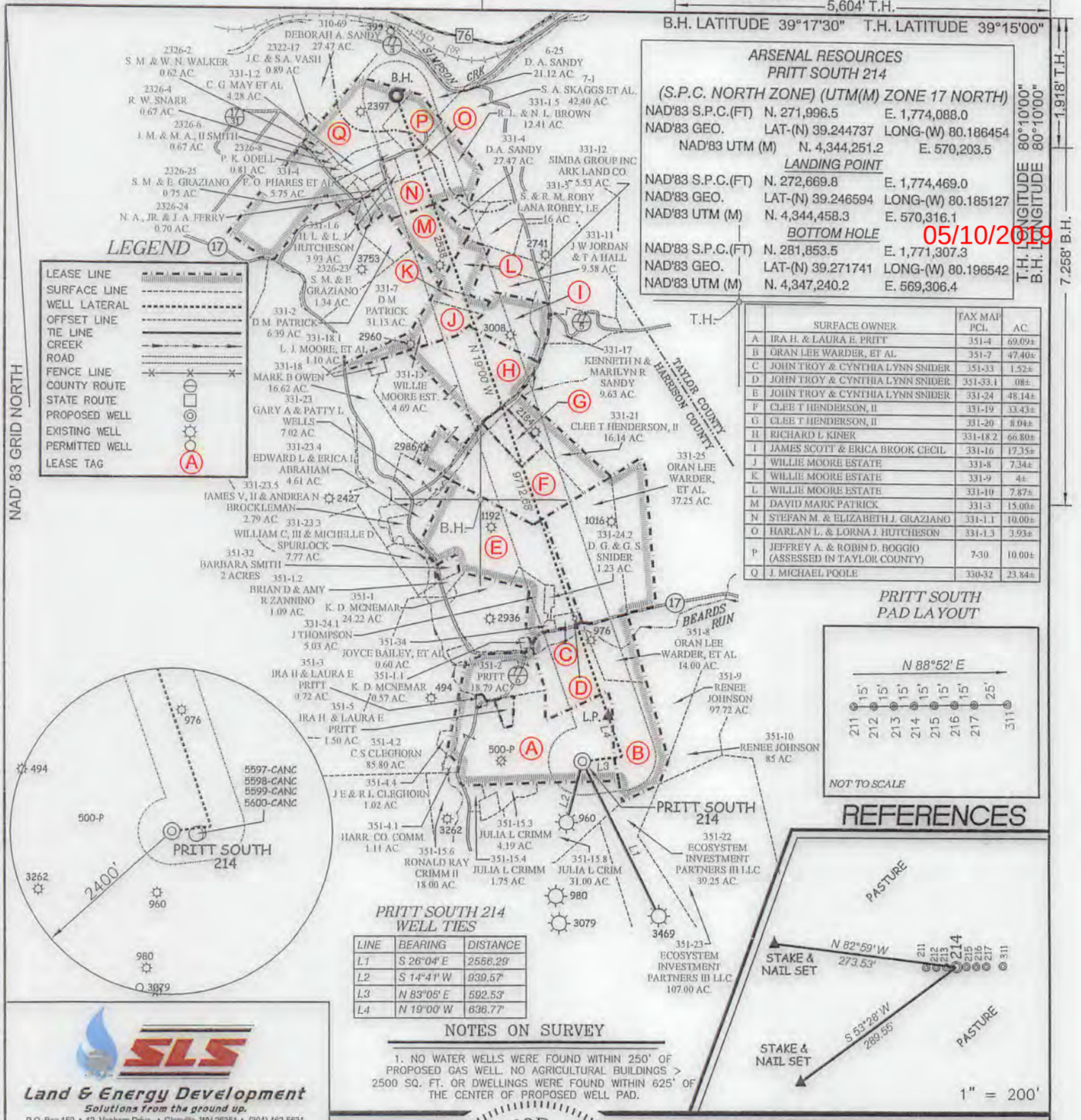
B.H. LATITUDE 39°17'30" T.H. LATITUDE 39°15'00"

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

1,918' T.H.

7,258' B.H.

NAD' 83 GRID NORTH



ARSENAL RESOURCES
PRITT SOUTH 214
(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)

NAD'83 S.P.C.(FT)	N. 271,996.5	E. 1,774,088.0
NAD'83 GEO.	LAT-(N) 39.244737	LONG-(W) 80.186454
NAD'83 UTM (M)	N. 4,344,251.2	E. 570,203.5

LANDING POINT

NAD'83 S.P.C.(FT)	N. 272,669.8	E. 1,774,469.0
NAD'83 GEO.	LAT-(N) 39.246594	LONG-(W) 80.185127
NAD'83 UTM (M)	N. 4,344,458.3	E. 570,316.1

BOTTOM HOLE

NAD'83 S.P.C.(FT)	N. 281,853.5	E. 1,771,307.3
NAD'83 GEO.	LAT-(N) 39.271741	LONG-(W) 80.196542
NAD'83 UTM (M)	N. 4,347,240.2	E. 569,306.4

05/10/2019

	SURFACE OWNER	TAX MAP PCL	AC.
A	IRA H. & LAURA E. PRITT	351-4	69.09±
B	ORAN LEE WARDER, ET AL	351-7	47.40±
C	JOHN TROY & CYNTHIA LYNN SNIDER	351-33	1.52±
D	JOHN TROY & CYNTHIA LYNN SNIDER	351-33.1	.08±
E	JOHN TROY & CYNTHIA LYNN SNIDER	331-24	48.14±
F	CLEE T HENDERSON, II	331-19	33.43±
G	CLEE T HENDERSON, II	331-20	8.04±
H	RICHARD L KINER	331-18.2	66.80±
I	JAMES SCOTT & ERICA BROOK CECIL	331-16	17.35±
J	WILLIE MOORE ESTATE	331-8	7.34±
K	WILLIE MOORE ESTATE	331-9	4±
L	WILLIE MOORE ESTATE	331-10	7.87±
M	DAVID MARK PATRICK	331-3	15.00±
N	STEFAN M. & ELIZABETH J. GRAZIANO	331-1.1	10.00±
O	HARLAN L. & LORNA J. HUTCHESON	331-1.3	3.93±
P	JEFFREY A. & ROBIN D. BOGGIO (ASSESSED IN TAYLOR COUNTY)	7-30	10.00±
Q	J. MICHAEL POOLE	330-32	23.84±

PRITT SOUTH PAD LAYOUT

REFERENCES

PRITT SOUTH 214 WELL TIES

LINE	BEARING	DISTANCE
L1	S 26°04' E	2556.29'
L2	S 14°41' W	939.57'
L3	N 83°05' E	592.53'
L4	N 19°00' W	636.77'

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.

1" = 200'

SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 ♦ 12 Vanhorn Drive ♦ Glenville, WV 26351 ♦ (304) 462-5634
www.slswv.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. 849 C. Victor Moyers

C. VICTOR MOYERS LICENSED No. 849 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

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

DATE AUGUST 23 , 20 17

REVISED 08/15/18 & 03/11/19

OPERATORS WELL NO. PRITT SOUTH 214

API WELL NO. 47 — 033 — 05910 MOD #2.
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500

FILE NO. 8383P214R5.dwg

SCALE 1" = 2000'

HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK)

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

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

LOCATION :

ELEVATION EXISTING: 1,351.90' / 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 X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X 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 17,916.4' TMD / 7,754' TVD

COUNTY NAME

PERMIT

WELL OPERATOR ARSENAL RESOURCES
ADDRESS 6031 WALLACE RD. EXT. SUITE 300
WEXFORD, PA 15090

DESIGNATED AGENT WILLIAM VEIGEL
ADDRESS 65 PROFESSIONAL PLACE
BRIDGEPORT, WV 26330

SLS
124588

FORM WW-6

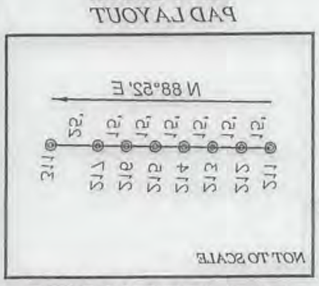
8,458' B.H.
5,604' T.H.
B.H. LATITUDE 39°17'30" T.H. LATITUDE 39°15'00"
B.H. LONGITUDE 80°10'00"
T.H. LONGITUDE 80°10'00"
7,326' B.H.
1,816' T.H.

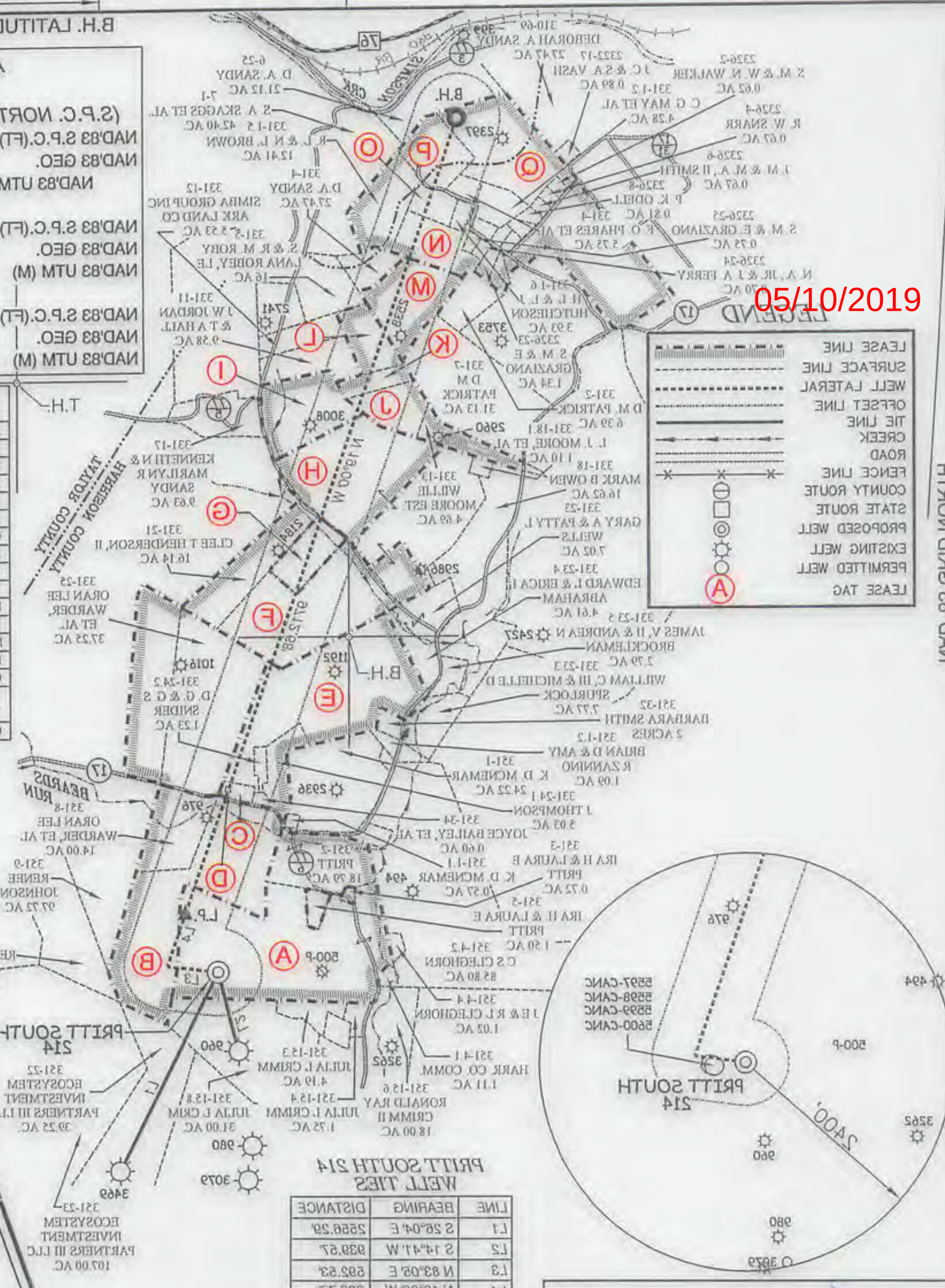
ARSENAL RESOURCES
PRITT SOUTH 214
(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)

NAD'83 S.P.C.(FT)	N. 271,996.5	E. 1,774,088.0
NAD'83 GEO.	LAT-(N) 39.244737	LONG-(W) 80.186454
NAD'83 UTM (M)	N. 4,344,251.2	E. 570,203.5
LANDING POINT		
NAD'83 S.P.C.(FT)	N. 272,669.8	E. 1,774,469.0
NAD'83 GEO.	LAT-(N) 39.246594	LONG-(W) 80.185127
NAD'83 UTM (M)	N. 4,344,458.3	E. 570,316.1
BOTTOM HOLE		
NAD'83 S.P.C.(FT)	N. 281,853.5	E. 1,771,307.3
NAD'83 GEO.	LAT-(N) 39.271741	LONG-(W) 80.196542
NAD'83 UTM (M)	N. 4,347,240.2	E. 569,306.4

	SURFACE OWNER	TAX MAP PCL.	AC.
A	IRA H. & LAURA E. PRITT	351-4	69.09±
B	ORAN LEE WARDER, ET AL	351-7	47.40±
C	JOHN TROY & CYNTHIA LYNN SNIDER	351-33	1.52±
D	JOHN TROY & CYNTHIA LYNN SNIDER	351-33.1	.08±
E	JOHN TROY & CYNTHIA LYNN SNIDER	331-24	48.14±
F	CLEE T HENDERSON, II	331-19	33.43±
G	CLEE T HENDERSON, II	331-20	8.04±
H	RICHARD L KINER	331-18.2	66.80±
I	JAMES SCOTT & ERICA BROOK CECIL	331-16	17.35±
J	WILLIE MOORE ESTATE	331-8	7.34±
K	WILLIE MOORE ESTATE	331-9	4±
L	WILLIE MOORE ESTATE	331-10	7.87±
M	DAVID MARK PATRICK	331-3	15.00±
N	STEFAN M. & ELIZABETH J. GRAZIANO	331-1.1	10.00±
O	HARLAN L. & LORNA J. HUTCHESON	331-1.3	3.93±
P	JEFFREY A. & ROBIN D. BOGGIO (ASSESSED IN TAYLOR COUNTY)	7-30	10.00±
Q	J. MICHAEL POOLE	330-32	23.84±

PRITT SOUTH PAD LAYOUT





05/10/2019

REFERENCES

PRITT SOUTH 214 WELL TIES

LINE	BEARING	DISTANCE
L1	S 26°04' E	2556.29'
L2	S 14°41' W	939.57'
L3	N 83°05' E	592.53'
L4	N 19°00' W	636.77'

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) 462-5634
www.slswv.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. 849 [signature]

C. VICTOR MOYERS LICENSED No. 849 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

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

DATE AUGUST 23, 20 17

REVISED 08/15/18 & 03/11/19

OPERATORS WELL NO. PRITT SOUTH 214

API WELL NO. 47 — 033 — 05910 MOD #2
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500

FILE NO. 8383P214R5.dwg

SCALE 1" = 2000'

HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK)

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

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

LOCATION:
ELEVATION EXISTING: 1,351.90' / 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±
LEASE NO. 00006622

PROPOSED WORK:
DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X 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 17,916.4' TMD / 7,754' TVD

WELL OPERATOR ARSENAL RESOURCES
ADDRESS 6031 WALLACE RD. EXT. SUITE 300
WEXFORD, PA 15090

DESIGNATED AGENT WILLIAM VEIGEL
ADDRESS 65 PROFESSIONAL PLACE
BRIDGEPORT, WV 26330

COUNTY NAME PERMIT