WR-35
Rev. 8/23/13

State of West Virginia
Department of Environmental Protection - Office of Oil and Gas
Well Operator's Report of Well Work

API 47 - 091 - 01330 County Taylor District Fetterman
Quad Gladesville Pad Name UNB Field/Pool Name
Farm name MacDonald, Charles E. Well Number 214
Operator (as registered with the OOG) Arsenal Resources
Address 6031 Wallace Rd. Ext City Wexford State PA Zip 15090

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey

	Northing	Easting
Top hole	4365441.18	591025.29
Landing Point of Curve	4365647.57	591022.88
Bottom Hole	4367267.44	590501.49

Elevation (ft) 1878 GL Type of Well ■ New □ Existing Type of Report □ Interim ■ Final

Permit Type □ Deviated □ Horizontal ■ Horizontal 6A □ Vertical Depth Type □ Deep ■ Shallow

Type of Operation □ Convert □ Deepen ■ Drill □ Plug Back □ Redrilling □ Rework □ Stimulate

Well Type □ Brine Disposal □ CBM ■ Gas □ Oil □ Secondary Recovery □ Solution Mining □ Storage □ Other ______

Type of Completion □ Single □ Multiple Fluids Produced □ Brine □ Gas □ NGL □ Oil □ Other ______
Drilled with □ Cable ■ Rotary

Drilling Media Surface hole □ Air □ Mud ■ Fresh Water Intermediate hole □ Air □ Mud ■ Fresh Water □ Brine
Production hole □ Air ■ Mud □ Fresh Water □ Brine
Mud Type(s) and Additive(s)
Oil Based Muds

Date permit issued 03/24/2017 Date drilling commenced 05/21/2017 Date drilling ceased 05/30/2017
Date completion activities began 08/10/2017 Date completion activities ceased 09/07/2017
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by N/A

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug

Freshwater depth(s) ft 350' Open mine(s) (Y/N) depths N
Salt water depth(s) ft 910' Void(s) encountered (Y/N) depths N
Coal depth(s) ft Lower Kittanning 438' Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

RECEIVED
Office of Oil and Gas
JAN 8 2018
WV Department of Environmental Protection

Reviewed by:

Reviewed
1-7-18

03/02/2018

API 47- 091 - 01330 Farm name MacDonald, Charles E. Well number 214

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	30"	24"	80'	New	94.0	NA	Y
Surface	17.5"	13 3/8"	538'	New	54.50	120'	Y
Coal							
Intermediate 1	12 1/4"	9 5/8"	1,528'	New	40.00	NA	Y
Intermediate 2							
Intermediate 3							
Production	8 1/2"	5 1/2"	14,133'	New	20.00	NA	N
Tubing							
Packer type and depth set							

Comment Details Cement to surface on Conductor, Surface, and Intermediate. Production Top of Cement at 1220 ft

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ^{3}/sks)	Volume (ft ^{3})	Cement Top (MD)	WOC (hrs)
Conductor	A	230	15.5	1.2	276	Surface	8+
Surface	A	515	15.60	1.19	613	Surface	8+
Coal							
Intermediate 1	A	263/172	14.50/15.70	1.55/1.29	408/222	Surface	8+
Intermediate 2							
Intermediate 3							
Production	A	1270/1344	13.80/15.00	1.33/1.30	1689/1747	1350'	8+
Tubing							

Drillers TD (ft) 14,133ft Loggers TD (ft) NA

Deepest formation penetrated Marcellus Plug back to (ft) NA

Plug back procedure NA

Kick off depth (ft) KOP of Curve at 7,390', No plug

Check all wireline logs run ☐ caliper ☐ density ☐ deviated/directional ☐ induction ☐ neutron ☐ resistivity ☐ gamma ray ☐ temperature ☐ sonic

Well cored ☐ Yes ■ No Conventional Sidewall Were cuttings collected ■ Yes ☐ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING

20"- 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.

WAS WELL COMPLETED AS SHOT HOLE ■ Yes ☐ No DETAILS completed 28 stages, 1120 perforations

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 091 - 01330 Farm name MacDonald, Charles E. Well number 214

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
		See Attached			

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
			See Attached					

Please insert additional pages as applicable.

Perforation Record

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
28	9/7/2017	8,487	8,649	40	Marcellus Shale
27	9/6/2017	8,687	8,849	40	Marcellus Shale
26	9/5/2017	8,887	9,049	40	Marcellus Shale
25	9/5/2017	9,087	9,249	40	Marcellus Shale
24	9/4/2017	9,287	9,449	40	Marcellus Shale
23	9/3/2017	9,487	9,649	40	Marcellus Shale
22	9/3/2017	9,687	9,849	40	Marcellus Shale
21	9/2/2017	9,887	10,049	40	Marcellus Shale
20	9/1/2017	10,087	10,249	40	Marcellus Shale
19	8/31/2017	10,287	10,449	40	Marcellus Shale
18	8/30/2017	10,487	10,649	40	Marcellus Shale
17	8/30/2017	10,687	10,849	40	Marcellus Shale
16	8/29/2017	10,887	11,049	40	Marcellus Shale
15	8/25/2017	11,087	11,249	40	Marcellus Shale
14	8/24/2017	11,287	11,449	40	Marcellus Shale
13	8/24/2017	11,487	11,649	40	Marcellus Shale
12	8/23/2017	11,687	11,849	40	Marcellus Shale
11	8/22/2017	11,887	12,049	40	Marcellus Shale
10	8/22/2017	12,087	12,249	40	Marcellus Shale
9	8/21/2017	12,287	12,449	40	Marcellus Shale
8	8/20/2017	12,487	12,649	40	Marcellus Shale
7	8/15/2017	12,687	12,849	40	Marcellus Shale
6	8/13/2017	12,887	13,049	40	Marcellus Shale
5	8/12/2017	13,087	13,249	40	Marcellus Shale
4	8/12/2017	13,287	13,449	40	Marcellus Shale
3	8/11/2017	13,487	13,649	40	Marcellus Shale
2	8/10/2017	13,687	13,849	40	Marcellus Shale
1	8/7/2017	13,887	14,047	40	Marcellus Shale

Stimulation Information Per Stage

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)
1	8/10/2017	75	7,844	5,799	4,532	482,080	9,387
2	8/11/2017	74	8,011	7,153	5,193	505,720	12,706
3	8/12/2017	72	8,221	7,063	4,688	500,360	14,012
4	8/12/2017	64	8,438	6,917	4,851	500,360	16,306
5	8/13/2017	72	8,141	7,482	5,383	503,600	12,012
6	8/15/2017	63	8,579	7,173	5,106	312,760	13,184
7	8/20/2017	73	7,941	6,192	6,037	511,900	12,979
8	8/21/2017	72	7,433	7,976	5,839	503,660	10,339
9	8/21/2017	76	8,138	6,946	5,998	499,680	12,716
10	8/22/2017	71	7,869	7,631	4,888	504,260	14,432
11	8/23/2017	72	7,811	7,802	5,030	501,720	12,176
12	8/24/2017	72	7,652	6,962	5,908	501,800	11,091
13	8/24/2017	77	7,892	7,167	5,928	501,980	10,910
14	8/25/2017	75	7,861	6,873	5,655	499,240	10,654
15	8/29/2017	79	7,790	7,247	5,982	501,840	9,927
16	8/29/2017	74	7,838	6,535	5,886	492,160	14,524
17	8/30/2017	74	7,947	7,206	5,294	501,940	13,995
18	8/31/2017	75	7,565	6,494	5,932	501,280	11,594
19	9/1/2017	81	7,713	7,403	6,118	500,840	10,041
20	9/1/2017	80	7,495	7,112	5,563	545,380	9,616
21	9/2/2017	75	7,838	7,545	5,721	496,740	12,140
22	9/3/2017	78	8,123	7,803	5,201	505,880	11,335
23	9/4/2017	78	8,281	7,876	5,679	502,240	12,099
24	9/4/2017	80	7,831	6,752	6,445	500,880	10,825
25	9/5/2017	75	8,137	7,455	6,087	479,780	14,439
26	9/6/2017	68	8,423	6,943	5,383	504,620	12,821
27	9/7/2017	75	8,292	7,843	5,421	499,620	13,475
28	9/8/2017	59	8,193	8,628	5,405	499,000	13,332

API 47- 091 - 01330 Farm name MacDonald, Charles E. Well number 214

PRODUCING FORMATION(S)	DEPTHS			
Marcellus Shale	7920	TVD	8204	MD

Please insert additional pages as applicable.

GAS TEST □ Build up □ Drawdown □ Open Flow OIL TEST □ Flow □ Pump

SHUT-IN PRESSURE Surface _____ psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW Gas _____ mcfpd Oil _____ bpd NGL _____ bpd Water _____ bpd GAS MEASURED BY □ Estimated □ Orifice □ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
Sand/silt	0	7470	0	7558	Sand/silt
Burket	7470	7492	7558	7580	Shale
Tully	7492	7642	7580	7743	Limestone
Mahantango	7642	7905	7743	8162	Shale
Marcellus	7905	7920	8162	8204	Shale
Purcell	7920	7924	8204	8216	Limestone
Lower Marcellus	7924	7753	8216	14133	Shale

Please insert additional pages as applicable.

Drilling Contractor H&P
Address 1437 South Boulder Ave. City Tulsa State OK Zip 74119

Logging Company NA
Address _____ City _____ State _____ Zip _____

Cementing Company Universal Well Services
Address 18360 Technology Dr. Box 4 City Meadville State PA Zip 16335

Stimulating Company Keane Group
Address 2121 Sage Road City Houston State Texas Zip 77056

Please insert additional pages as applicable.

Completed by Arsenal Resources Telephone 304-629-6369
Signature _____ Title Permitting Manager Date 1/3/2018

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	8/10/2017
Job End Date:	9/8/2017
State:	West Virginia
County:	Taylor
API Number:	47-091-01330-00-00
Operator Name:	Arsenal Resources
Well Name and Number:	UNB 214H
Latitude:	39.43395700
Longitude:	-79.94383000
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	7,986
Total Base Water Volume (gal):	14,609,154
Total Base Non Water Volume:	0

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Ascent	Carrier/Base Fluid					
			Water	7732-18-5	100.00000	89.34766	None
Sand (Proppant)	Keane	Proppant					
			Crystalline silica: Quartz (SiO2)	14808-60-7	100.00000	10.15866	None
Hydrochloric Acid (7.5%)	Keane	Acid Inhibitor					
			Water	7732-18-5	92.50000	0.32904	None
			Hydrochloric Acid	7647-01-0	7.50000	0.02668	None
KFR-16FW	Keane	Friction Reducer					
			Water	7732-18-5	60.00000	0.06698	None
			Distillates (petroleum), hydrotreated light	64742-47-8	20.00000	0.02233	None
			ammonium chloride	12125-02-9	1.50000	0.00167	None
			oleic acid diethanolamide	93-83-4	1.50000	0.00167	None
			alcohols, C12-16, ethoxylated	68551-12-2	1.00000	0.00112	None
MBC-516	Keane	Biocide					
			Water	7732-18-5	56.70000	0.00532	None
			Glutaral	111-30-8	26.70000	0.00250	None

			didecyldimethylammonium chloride	7173-51-5	8.00000	0.00075	None
			quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl, chlorides	68424-85-1	5.30000	0.00050	None
			ethonal	64-17-5	2.80000	0.00026	None
KLSI-21	Keane	Scale Inhibitor					
			polyphosphoric acids, esters with triethanolamine, sodium salts	68131-72-6	30.00000	0.00461	None
KAI-12	Keane	Acid Inhibitor					
			Ethylene glycol	107-21-1	40.00000	0.00064	None
			dipropylene gylcol, monomethyl ether	34590-94-8	20.00000	0.00032	None
			Tar bases, quinoline derivs., benzyl chloride-quaternized	72480-70-7	10.00000	0.00016	None
			Cinnamaldehyde	104-55-2	10.00000	0.00016	None
			Ethoxylated alcohol	68131-39-5	10.00000	0.00016	None
			formic acid	64-18-6	10.00000	0.00016	None
			isoproyl alcohol	67-63-0	5.00000	0.00008	None
Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS.							
Other Chemical(s)	Listed Above	See Trade Name(s) List					
			Water	7732-18-5	92.50000	0.32904	
			Distillates (petroleum), hydrotreated light	64742-47-8	20.00000	0.02233	
			Glutaral	111-30-8	26.70000	0.00250	
			oleic acid diethanolamide	93-83-4	1.50000	0.00167	
			ammonium chloride	12125-02-9	1.50000	0.00167	
			alcohols, C12-16, ethoxylated	68551-12-2	1.00000	0.00112	
			didecyldimethylammonium chloride	7173-51-5	8.00000	0.00075	
			quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl, chlorides	68424-85-1	5.30000	0.00050	
			dipropylene gylcol, monomethyl ether	34590-94-8	20.00000	0.00032	
			ethonal	64-17-5	2.80000	0.00026	
			formic acid	64-18-6	10.00000	0.00016	
			Ethoxylated alcohol	68131-39-5	10.00000	0.00016	
			Tar bases, quinoline derivs., benzyl chloride-quaternized	72480-70-7	10.00000	0.00016	
			Cinnamaldehyde	104-55-2	10.00000	0.00016	
			isoproyl alcohol	67-63-0	5.00000	0.00008	
			Water	7732-18-5	85.00000	0.00000	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water
** Information is based on the maximum potential for concentration and thus the total may be over 100%

Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided.
Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)

Latitude: 39°27'30" — 7,737' SHL

8,958' BHL

THRASHER

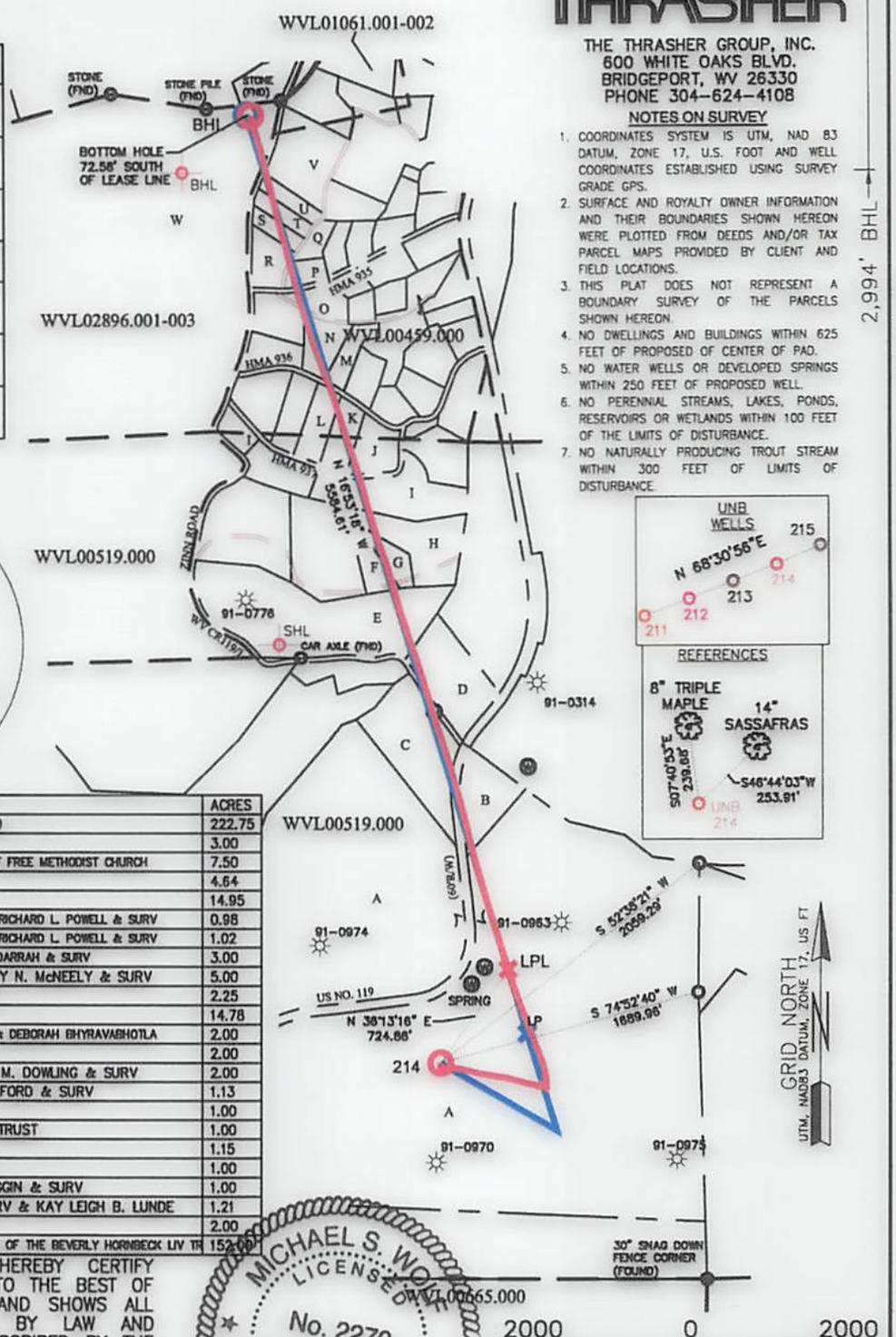
THE THRASHER GROUP, INC.
600 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE 304-624-4108

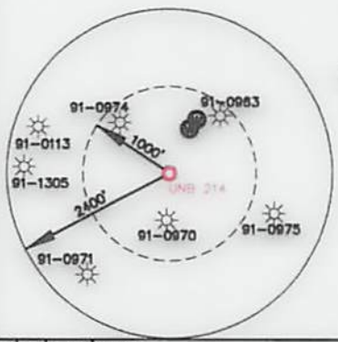
PROPOSED COORDINATES UTM (NAD83, ZONE 17, METERS):	
SURFACE HOLE LOCATION (SHL):	
NORTHING:	4,365,467.22
EASTING:	590,895.35
LANDING POINT LOCATION (LPL):	
NORTHING:	4,365,525.98
EASTING:	591,061.59
BOTTOM HOLE LOCATION (BHL):	
NORTHING:	4,367,268.81
EASTING:	590,493.86
AS-DRILLED COORDINATES UTM (NAD83, ZONE 17, METERS):	
SURFACE HOLE LOCATION (SHL):	
NORTHING:	4,365,441.18
EASTING:	591,025.29
LANDING POINT LOCATION (LPL):	
NORTHING:	4,365,647.57
EASTING:	591,022.88
BOTTOM HOLE LOCATION (BHL):	
NORTHING:	4,367,267.44
EASTING:	590,501.49

03/02/2018

NOTES ON SURVEY

1. COORDINATES SYSTEM IS UTM, NAD 83 DATUM, ZONE 17, U.S. FOOT AND WELL COORDINATES ESTABLISHED USING SURVEY GRADE GPS.
2. SURFACE AND ROYALTY OWNER INFORMATION AND THEIR BOUNDARIES SHOWN HEREON WERE PLOTTED FROM DEEDS AND/OR TAX PARCEL MAPS PROVIDED BY CLIENT AND FIELD LOCATIONS.
3. THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARCELS SHOWN HEREON.
4. NO DWELLINGS AND BUILDINGS WITHIN 625 FEET OF PROPOSED OF CENTER OF PAD.
5. NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF PROPOSED WELL.
6. NO PERENNIAL STREAMS, LAKES, PONDS, RESERVOIRS OR WETLANDS WITHIN 100 FEET OF THE LIMITS OF DISTURBANCE.
7. NO NATURALLY PRODUCING TROUT STREAM WITHIN 300 FEET OF LIMITS OF DISTURBANCE.





ID	TM	PAR	OWNER	ACRES
A	3	16	N/F CHARLES E. MacDONALD	222.75
B	3	22	N/F MARY ERICKSON	3.00
C	3	17	N/F TRUSTEES FAIRMONT DIST. OF FREE METHODIST CHURCH	7.50
D	3	15.1	N/F WILLIAM J. LOGAR	4.64
E	3	1.1	N/F JOHN V. ZINN II	14.95
F	3	1.40	N/F JAMES O., GWENDOLYN J. & RICHARD L. POWELL & SURV	0.98
G	3	1.26	N/F JAMES O., GWENDOLYN J. & RICHARD L. POWELL & SURV	1.02
H	3	1.48	N/F MICHAEL A. & MARJORIE A. DARRAH & SURV	3.00
I	3	1.22	N/F RANDALL D. & KIMBERLY N. McNEELY & SURV	5.00
J	3	1.12	N/F KENNETH E. RICHARDS	2.25
K	3	1	N/F KIMBERLY BRYAN	14.78
L	3	1.53	N/F HARRIET J. STUMP & SURV & DEBORAH BHYRAVABHOTLA	2.00
M	3	1.16	N/F MARY A. DAVIDSON	2.00
N	3	1.31	N/F RICHARD A. & ANGELA M. DOWLING & SURV	2.00
O	3	1.28	N/F STEPHEN M. & AMY L. FORD & SURV	1.13
P	3	1.39	N/F PNC BANK TRUSTEE	1.00
Q	3	1.41	N/F FIRST UNITED BANK & TRUST	1.00
R	3	1.50	N/F RONALD L. STROUPE	1.15
S	3	1.46	N/F TRISH J. HERN	1.00
T	3	1.44	N/F DAVID & JOSEPHINE BIGGIN & SURV	1.00
U	3	1.43	N/F CALEB J. SISLER & SURV & KAY LEIGH B. LUNDE	1.21
V	27	5.9	N/F ONA P. DINGESS	2.00
W	27	4	N/F BEVERLY HORNBECK TRUSTEE OF THE BEVERLY HORNBECK LIV TR	152.00

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 REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

P.S. 2270 9/29/17

MICHAEL S. WOLFE LICENSED PROFESSIONAL SURVEYOR No. 2270 STATE OF WEST VIRGINIA

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

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25034

MINIMUM DEGREE OF ACCURACY: 1/200

PROVEN SOURCE OF ELEVATION: SURVEY GRADE GPS (NAVD 88, US FT)

UNB NO.

OPERATOR'S WELL #: 214

API WELL #: 47 (STATE) 091 (COUNTY) (PERMIT)

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

WATERSHED: WHITE DAY CREEK
ELEVATION: 1878'

DISTRICT: FETTERMAN COUNTY: TAYLOR
QUADRANGLE: GLADESVILLE 7.5'

SURFACE OWNER: CHARLES MacDONALD
ACREAGE: ± 222.75

OIL & GAS ROYALTY OWNER: JP MORGAN
ACREAGE: ± 447.36 (LEASE)

DRILL DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION

CONVERT PLUG & ABANDON CLEAN OUT & REPLUG OTHER CHANGE ☒ (SPECIFY) AS-DRILLED

TARGET FORMATION: MARCELLUS SHALE
ESTIMATED DEPTH: 7,971 TVD 14,133 TMD

WELL OPERATOR: ARSENAL RESOURCES
ADDRESS: 6031 WALLACE ROAD EXTENSION #300
CITY: WEXFORD STATE: PA ZIP CODE: 15090

DESIGNATED AGENT: WILLIAM VEIGEL
ADDRESS: 65 PFROFESSIONAL PLACE, SUITE 200
CITY: BRIDGEPORT STATE: WV ZIP CODE: 26330

LEGEND:
- PROPOSED SURFACE HOLE / BOTTOM HOLE
- EXISTING / PRODUCING WELLHEAD
- LPL LANDING POINT LOCATION
- (W) EXISTING WATER WELL
- (S) EXISTING SPRING
- LEASE BOUNDARY
- AS-DRILLED PATH
- PROPOSED PATH

REVISIONS:	DATE: 09-29-2017
	DRAWN BY: R.DOERR
	SCALE: 1" = 2000'
	DRAWING NO: XXXXX
	WELL LOCATION PLAT

L:\030-2770 - MK - UNB SOUTH ROAD ACCESS\SURVEY\AS-DRILLED\WELLS 211-215.DWG
FRIDAY SEPTEMBER 29 2017 10:57AM

2,994' BHL

8,916' SHL

Longitude: 79°55'00"