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 - 01328 County Taylor District Fetterman
Quad Gladesville Pad Name UNB Field/Pool Name
Farm name MacDonald, Charles E. Well Number 212
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

Top hole	Northing 4365463.76	Easting 590886.28
Landing Point of Curve	Northing 4365260.59	Easting 590720.65
Bottom Hole	Northing 4367235.63	Easting 590080.65

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 04/28/2017 Date drilling ceased 05/09/2017
Date completion activities began 09/09/2017 Date completion activities ceased 09/29/2017
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 438' (Lower Kittanning) Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

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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"	532'	New	54.50	120'	Y
Coal							
Intermediate 1	12 1/4"	9 5/8"	1,523.6'	New	40.00	NA	Y
Intermediate 2							
Intermediate 3							
Production	8 1/2"	5 1/2"	16,300'	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 1350 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	15.6	1.2	276	Surface	8+
Surface	A	564	15.60	1.20	676.8	Surface	8+
Coal							
Intermediate 1	A	264/172	14.50/15.70	1.55/1.29	409/222	Surface	8+
Intermediate 2							
Intermediate 3							
Production	A	1346/1676	13.80/15.00	1.33/1.30	1790/2179	1300'	8+
Tubing							

Drillers TD (ft) 16,300ft 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 7,755', 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 Well completed in 35 stages, 1400 perforations

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

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

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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.

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Perforation Record

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations (s)
35	9/29/2017	9,255	9,417	40	Marcellus Shale
34	9/28/2017	9,455	9,617	40	Marcellus Shale
33	9/28/2017	9,655	9,817	40	Marcellus Shale
32	9/27/2017	9,855	10,017	40	Marcellus Shale
31	9/27/2017	10,055	10,217	40	Marcellus Shale
30	9/26/2017	10,255	10,417	40	Marcellus Shale
29	9/26/2017	10,455	10,617	40	Marcellus Shale
28	9/25/2017	10,655	10,817	40	Marcellus Shale
27	9/25/2017	10,855	11,017	40	Marcellus Shale
26	9/24/2017	11,055	11,217	40	Marcellus Shale
25	9/24/2017	11,255	11,417	40	Marcellus Shale
24	9/23/2017	11,455	11,617	40	Marcellus Shale
23	9/23/2017	11,655	11,817	40	Marcellus Shale
22	9/22/2017	11,855	12,017	40	Marcellus Shale
21	9/22/2017	12,055	12,217	40	Marcellus Shale
20	9/21/2017	12,255	12,417	40	Marcellus Shale
19	9/21/2017	12,455	12,617	40	Marcellus Shale
18	9/20/2017	12,655	12,817	40	Marcellus Shale
17	9/17/2017	12,855	13,017	40	Marcellus Shale
16	9/16/2017	13,055	13,217	40	Marcellus Shale
15	9/16/2017	13,255	13,417	40	Marcellus Shale
14	9/15/2017	13,455	13,617	40	Marcellus Shale
13	9/15/2017	13,655	13,817	40	Marcellus Shale
12	9/14/2017	13,855	14,017	40	Marcellus Shale
11	9/14/2017	14,055	14,217	40	Marcellus Shale
10	9/13/2017	14,255	14,417	40	Marcellus Shale
9	9/13/2017	14,455	14,617	40	Marcellus Shale
8	9/12/2017	14,655	14,817	40	Marcellus Shale
7	9/12/2017	14,855	15,017	40	Marcellus Shale
6	9/11/2017	15,055	15,217	40	Marcellus Shale
5	9/11/2017	15,255	15,417	40	Marcellus Shale
4	9/10/2017	15,455	15,617	40	Marcellus Shale
3	9/10/2017	15,655	15,817	40	Marcellus Shale
2	9/9/2017	15,855	16,017	40	Marcellus Shale
1	8/6/2017	16,055	16,214	40	Marcellus Shale

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Stimulation Information Per 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)
1	09/09/2017	69	7563	6149	4,794	501,966	13,812
2	09/09/2017	69	7959	6428	5,136	497,400	14,626
3	09/10/2017	74	8116	7423	5,508	505,760	14,415
4	09/10/2017	69	8301	7176	5,211	502,700	15,990
5	09/11/2017	72	8112	7307	5,809	500,520	11,638
6	09/11/2017	74	7910	6965	5,978	499,520	11,198
7	09/12/2017	80	8218	6717	5,923	505,280	11,775
8	09/12/2017	66	8144	7068	5,890	500,460	13,139
9	09/13/2017	78	8264	6837	5,938	508,640	11,558
10	09/13/2017	78	8272	6618	5,912	502,400	12,276
11	09/14/2017	81	8444	7328	5,615	503,520	11,537
12	09/14/2017	78	8001	6822	6,120	501,060	12,479
13	09/15/2017	73	8322	6814	5,330	500,540	14,913
14	09/15/2017	69	8035	6263	5,584	502,500	15,068
15	09/16/2017	81	8060	6383	5,765	504,380	11,352
16	09/16/2017	81	7688	5860	6,040	503,660	11,036
17	09/20/2017	78	8143	7253	6,010	504,620	12,118
18	09/20/2017	78	8211	7052	5,585	502,600	12,561
19	09/21/2017	67	8247	7419	5,343	504,340	14,111
20	09/21/2017	67	8118	6586	5,780	505,320	13,617
21	09/22/2017	74	8243	7052	6,328	502,720	13,205
22	09/22/2017	80	7795	6434	5,943	500,440	10,597
23	09/23/2017	78	8009	7077	5,726	503,660	13,543
24	09/23/2017	80	7887	7000	5,904	501,200	10,769
25	09/24/2017	80	7960	7003	6,112	500,500	10,723
26	09/24/2017	79	7663	6826	6,110	499,280	10,610
27	09/25/2017	78	7875	7205	5,935	497,620	11,768
28	09/25/2017	75	7910	7363	5,679	501,540	12,672
29	09/26/2017	77	8082	6984	5,790	501,120	11,469
30	09/26/2017	67	8087	7337	5,492	500,280	12,971
31	09/26/2017	75	8292	6672	6,089	465,060	12,254
32	09/27/2017	64	8309	6723	6,352	455,820	13,571
33	09/28/2017	72	8355	6761	6,428	500,840	15,691
34	09/28/2017	78	8140	7348	6,455	502,580	11,892
35	09/29/2017	77	8060	7827	6,201	502,260	11,890

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PRODUCING FORMATION(S)	DEPTHS	
Marcellus	7911 TVD	8466 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 NAME	TOP DEPTH IN FT 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	7575	0	7975	Sand/silt
Burket	7575	7589	7975	7989	Shale
Tully	7589	7716	7989	8150	Limestone
Mahantango	7716	7900	8150	8438	Shale
Marcellus	7900	7911	8438	8466	Shale
Purcell	7911	7913	8466	8471	Limestone
Lower Marcellus	7913	7977	8471	8720	Shale
Onondaga	7977	7991	8720	8914	Limestone
Lower Marcellus	7991	7732	8914	16300	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 TX Zip 77056

Please insert additional pages as applicable.

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Completed by Arsenal Resources Eddie Carder Telephone 304-629-6309
Signature [signature] Title Permitting Manager Date 1/5/2018

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

Hydraulic Fracturing Fluid Product Component Information Disclosure

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Job Start Date:	9/9/2017
Job End Date:	9/29/2017
State:	West Virginia
County:	Taylor
API Number:	47-091-01328-00-00
Operator Name:	Arsenal Resources
Well Name and Number:	UNB 212H
Latitude:	39.44990200
Longitude:	-79.95323300
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	7,963
Total Base Water Volume (gal):	18,965,058
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	89.61245	None
Sand (Proppant)	Keane	Proppant					
			Crystalline silica: Quartz (SiO2)	14808-60-7	100.00000	9.90444	None
Hydrochloric Acid (7.5%)	Keane	Acid Inhibitor					
			Water	7732-18-5	92.50000	0.32050	None
			Hydrochloric Acid	7647-01-0	7.50000	0.02599	None
KFR-16FW	Keane	Friction Reducer					
			Water	7732-18-5	60.00000	0.06614	None
			Distillates (petroleum), hydrotreated light	64742-47-8	20.00000	0.02205	None
			ammonium chloride	12125-02-9	1.50000	0.00165	None
			oleic acid diethanolamide	93-83-4	1.50000	0.00165	None
			alcohols, C12-16, ethoxylated	68551-12-2	1.00000	0.00110	None
MBC-516	Keane	Biocide					
			Water	7732-18-5	56.70000	0.00545	None
			Glutaral	111-30-8	26.70000	0.00257	None

			didecyldimethylammonium chloride	7173-51-5	8.00000	0.00077	None
			quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl, chlorides	68424-85-1	5.30000	0.00051	None
			ethonal	64-17-5	2.80000	0.00027	None
KLSI-21	Keane	Scale Inhibitor					
			polyphosphoric acids, esters with triethanolamine, sodium salts	68131-72-6	30.00000	0.00456	None
KAI-12	Keane	Acid Inhibitor					
			Ethylene glycol	107-21-1	40.00000	0.00063	None
			dipropylene gylcol, monomethyl ether	34590-94-8	20.00000	0.00031	None
			formic acid	64-18-6	10.00000	0.00016	None
			Ethoxylated alcohol	68131-39-5	10.00000	0.00016	None
			Cinnamaldehyde	104-55-2	10.00000	0.00016	None
			Tar bases, quinoline derivs., benzyl chloride-quaternized	72480-70-7	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	0.32050	
			Distillates (petroleum), hydrotreated light	64742-47-8	20.00000	0.02205	
			Glutaral	111-30-8	26.70000	0.00257	
			ammonium chloride	12125-02-9	1.50000	0.00165	
			oleic acid diethanolamide	93-83-4	1.50000	0.00165	
			alcohols, C12-16, ethoxylated	68551-12-2	1.00000	0.00110	
			didecyldimethylammonium chloride	7173-51-5	8.00000	0.00077	
			quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl, chlorides	68424-85-1	5.30000	0.00051	
			dipropylene gylcol, monomethyl ether	34590-94-8	20.00000	0.00031	
			ethonal	64-17-5	2.80000	0.00027	
			Ethoxylated alcohol	68131-39-5	10.00000	0.00016	
			formic acid	64-18-6	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)

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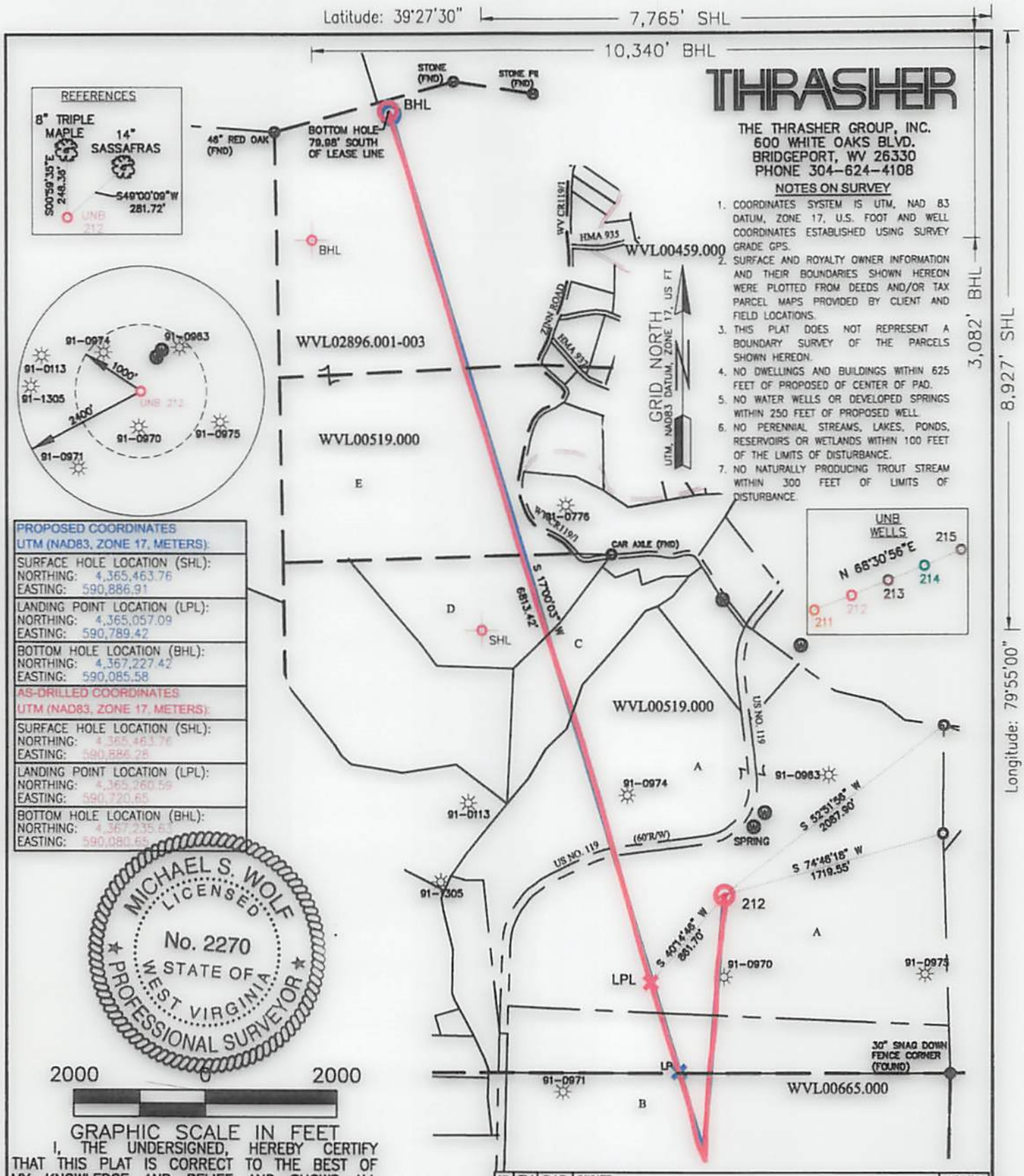

THRASHER

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

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	6	7	VIRGINIA MORGAN BREWER	230.00
C	3	19.1	N/F CHARLES EDWARD & LAVERNE MACDONALD & SURV	20.26
D	3	19	N/F BEVERLY HORNBECK TRUSTEE OF THE BEVERLY HORNBECK LIVING TRUST	24.50
E	27	4	N/F BEVERLY HORNBECK TRUSTEE OF THE BEVERLY HORNBECK LIVING TRUST	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

(+) 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)

OPERATOR'S WELL #: UNB NO. 212

API WELL #: 47 STATE 091 COUNTY 01328 PERMIT

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

WATERSHED: WHITE DAY CREEK

DISTRICT: FETTERMAN COUNTY: TAYLOR

ELEVATION: 1878'

QUADRANGLE: GLADESVILLE 7.5'

SURFACE OWNER: CHARLES MacDONALD ACREAGE: ± 222.75

OIL & GAS ROYALTY OWNER: JP MORGAN ACREAGE: ± 649.51 (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: 7,999 TVD 16,300 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
- EXISTING WATER WELL
- EXISTING SPRING
- LEASE BOUNDARY
- AS-DRILLED PATH
- PROPOSED PATH

REVISIONS:

DATE: 09-26-2017
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 11:00AM