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 - 01329 County Taylor District Fetterman
Quad Gladesville Pad Name UNB Field/Pool Name
Farm name MacDonald, Charles E. Well Number 213
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 4365465.52	Easting 590891.14
Landing Point of Curve	Northing 4365459.43	Easting 590868.63
Bottom Hole	Northing 4367268.59	Easting 590278.44

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 05/10/2017 Date drilling ceased 05/20/2017
Date completion activities began 08/10/2017 Date completion activities ceased 9/08/2017
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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Reviewed by:

Reviewed
6-11-18

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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"	527'	New	54.50	120'	Y
Coal							
Intermediate 1	12 1/4"	9 5/8"	1,568'	New	40.00	NA	Y
Intermediate 2							
Intermediate 3							
Production	8 1/2"	5 1/2"	14,692'	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	15.6	1.2	276	Surface	8+
Surface	A	515	15.60	1.20	618	Surface	8+
Coal							
Intermediate 1	A	269/173	14.50/15.70	1.55/1.29	417/223	Surface	8+
Intermediate 2							
Intermediate 3							
Production	A	1245/1451	13.80/15.00	1.33/1.30	1656/1886	1350'	8+
Tubing							

Drillers TD (ft) 14,700ft 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 7,364', 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 31 stages, 1240 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	Formation(s)
31	9/7/2015	8,446	8,608	40	Marcellus Shale
30	9/7/2017	8,646	8,808	40	Marcellus Shale
29	9/6/2017	8,846	9,008	40	Marcellus Shale
28	9/5/2017	9,046	9,208	40	Marcellus Shale
27	9/4/2017	9,246	9,408	40	Marcellus Shale
26	9/4/2017	9,446	9,608	40	Marcellus Shale
25	9/3/2017	9,646	9,808	40	Marcellus Shale
24	9/3/2017	9,846	10,008	40	Marcellus Shale
23	9/1/2017	10,046	10,208	40	Marcellus Shale
22	9/1/2017	10,246	10,408	40	Marcellus Shale
21	8/31/2017	10,446	10,608	40	Marcellus Shale
20	8/30/2017	10,646	10,808	40	Marcellus Shale
19	8/29/2017	10,846	11,008	40	Marcellus Shale
18	8/29/2017	11,046	11,208	40	Marcellus Shale
17	8/25/2017	11,246	11,408	40	Marcellus Shale
16	8/24/2017	11,446	11,608	40	Marcellus Shale
15	8/24/2015	11,646	11,808	40	Marcellus Shale
14	8/23/2017	11,846	12,008	40	Marcellus Shale
13	8/22/2017	12,046	12,208	40	Marcellus Shale
12	8/21/2017	12,246	12,408	40	Marcellus Shale
11	8/21/2017	12,446	12,608	40	Marcellus Shale
10	8/20/2017	12,646	12,808	40	Marcellus Shale
9	8/14/2017	12,846	13,008	40	Marcellus Shale
8	8/13/2017	13,046	13,208	40	Marcellus Shale
7	8/13/2017	13,246	13,408	40	Marcellus Shale
6	8/12/2017	13,446	13,608	40	Marcellus Shale
5	8/12/2017	13,646	13,808	40	Marcellus Shale
4	8/11/2017	13,846	14,008	40	Marcellus Shale
3	8/11/2017	14,046	14,208	40	Marcellus Shale
2	8/10/2017	14,246	14,408	40	Marcellus Shale
1	8/6/2017	14,446.00	14,606.00	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	8/10/2017	69	8183	6255	5,194	532,780	15,264
2	8/10/2017	74	8522	6894	4,787	600,040	18,393
3	8/11/2017	72	8315	7615	5,015	611,900	16,132
4	8/11/2017	72	8414	6857	5,781	428,760	13,925
5	8/12/2017	72	8207	7969	6,252	592,200	12,333
6	8/13/2017	69	7953	7765	5,309	586,140	14,194
7	8/13/2017	68	8096	6808	4,941	546,520	13,703
8	8/14/2017	70	8050	6420	6,135	604,080	14,245
9	8/20/2017	72	7934	7674	5,862	609,060	13,803
10	8/20/2017	78	7742	5897	5,850	599,680	15,798
11	8/21/2017	75	8188	7238	5,698	564,240	14,807
12	8/22/2017	71	7990	7010	5,983	578,120	14,415
13	8/23/2017	72	7551	7083	5,784	600,700	13,231
14	8/23/2017	73	8068	7328	6,070	598,160	15,231
15	8/24/2017	70	7688	7534	5,908	595,040	12,651
16	8/25/2017	79	7803	6964	5,815	598,260	13,200
17	8/25/2017	77	7935	7706	7,944	596,120	12,164
18	8/29/2017	74	7687	7125	4,858	604,120	14,630
19	8/30/2017	78	7586	6427	5,459	602,460	13,109
20	8/31/2017	78	7678	7054	5,683	604,160	12,025
21	8/31/2017	78	7358	6484	5,938	636,100	14,406
22	9/1/2017	77	7614	7384	5,142	594,540	12,693
23	9/2/2017	80	7604	6615	5,035	598,280	11,805
24	9/3/2017	80	7721	6686	5,879	602,280	11,656
25	9/3/2017	75	8004	6416	6,193	519,640	15,606
26	9/4/2017	80	7872	6508	6,207	601,220	12,501
27	9/5/2017	79	8052	7557	6,231	600,480	12,884
28	9/6/2017	76	8160	7243	6,036	600,120	14,931
29	9/6/2017	78	7987	6734	6,608	603,780	13,311
30	9/7/2017	71	8083	7361	5,088	595,040	16,811
31	9/8/2017	65	8294	7457	6,263	366,860	15,463

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PRODUCING FORMATION(S)	DEPTHS	
Marcellus Shale	7938 TVD	8167 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	7498	0	7561	Sand/silt
Burket	7498	7510	7561	7574	Shale
Tully	7510	7640	7574	7711	Limestone
Mahantango	7640	7888	7711	8055	Shale
Marcellus	7888	7938	8055	8167	Shale
Purcell	7938	7941	8167	8179	Limestone
Lower Marcellus	7941	7737	8179	14698	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.

Completed by Arsenal Resources Eddie Carder Telephone 304-629-6309
Signature [signature] Title Permitting Manager Date 1/3/2018

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

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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:	47-091-01329-00-00
Operator Name:	Arsenal Resources
Well Name and Number:	UNB 213H
Latitude:	39.45016000
Longitude:	-79.95070000
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	7,988
Total Base Water Volume (gal):	18,539,556
Total Base Non Water Volume:	0

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

Interstate Oil & Gas Compact Commission

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	89.49522	None
Sand (Proppant)	Keane	Proppant					
			Crystalline silica: Quartz (SiO2)	14808-60-7	100.00000	10.04696	None
Hydrochloric Acid (7.5%)	Keane	Acid Inhibitor					
			Water	7732-18-5	92.50000	0.29744	None
			Hydrochloric Acid	7647-01-0	7.50000	0.02412	None
KFR-16FW	Keane	Friction Reducer					
			Water	7732-18-5	60.00000	0.06624	None
			Distillates (petroleum), hydrotreated light	64742-47-8	20.00000	0.02208	None
			ammonium chloride	12125-02-9	1.50000	0.00166	None
			pleic acid diethanolamide	93-83-4	1.50000	0.00166	None
			alcohols, C12-16, ethoxylated	68551-12-2	1.00000	0.00110	None
MBC-516	Keane	Biocide					
			Water	7732-18-5	56.70000	0.00521	None
			Glutaral	111-30-8	26.70000	0.00245	None

			didecyldimethylammonium chloride	7173-51-5	8.00000	0.00073	None
			quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl, chlorides	68424-85-1	5.30000	0.00049	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	0.00457	None
KAI-12	Keane	Acid Inhibitor					
			Ethylene glycol	107-21-1	40.00000	0.00058	None
			dipropylene gylcol, monomethyl ether	34590-94-8	20.00000	0.00029	None
			Ethoxylated alcohol	68131-39-5	10.00000	0.00015	None
			Cinnamaldehyde	104-55-2	10.00000	0.00015	None
			formic acid	64-18-6	10.00000	0.00015	None
			Tar bases, quinoline derivs., benzyl chloride-quaternized	72480-70-7	10.00000	0.00015	None
			isoproyl alcohol	67-63-0	5.00000	0.00007	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	0.29744	
			Distillates (petroleum), hydrotreated light	64742-47-8	20.00000	0.02208	
			Glutaral	111-30-8	26.70000	0.00245	
			ammonium chloride	12125-02-9	1.50000	0.00166	
			oleic acid diethanolamide	93-83-4	1.50000	0.00166	
			alcohols, C12-16, ethoxylated	68551-12-2	1.00000	0.00110	
			didecyldimethylammonium chloride	7173-51-5	8.00000	0.00073	
			quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl, chlorides	68424-85-1	5.30000	0.00049	
			dipropylene gylcol, monomethyl ether	34590-94-8	20.00000	0.00029	
			ethonal	64-17-5	2.80000	0.00026	
			Cinnamaldehyde	104-55-2	10.00000	0.00015	
			Tar bases, quinoline derivs., benzyl chloride-quaternized	72480-70-7	10.00000	0.00015	
			Ethoxylated alcohol	68131-39-5	10.00000	0.00015	
			formic acid	64-18-6	10.00000	0.00015	
			isoproyl alcohol	67-63-0	5.00000	0.00007	
			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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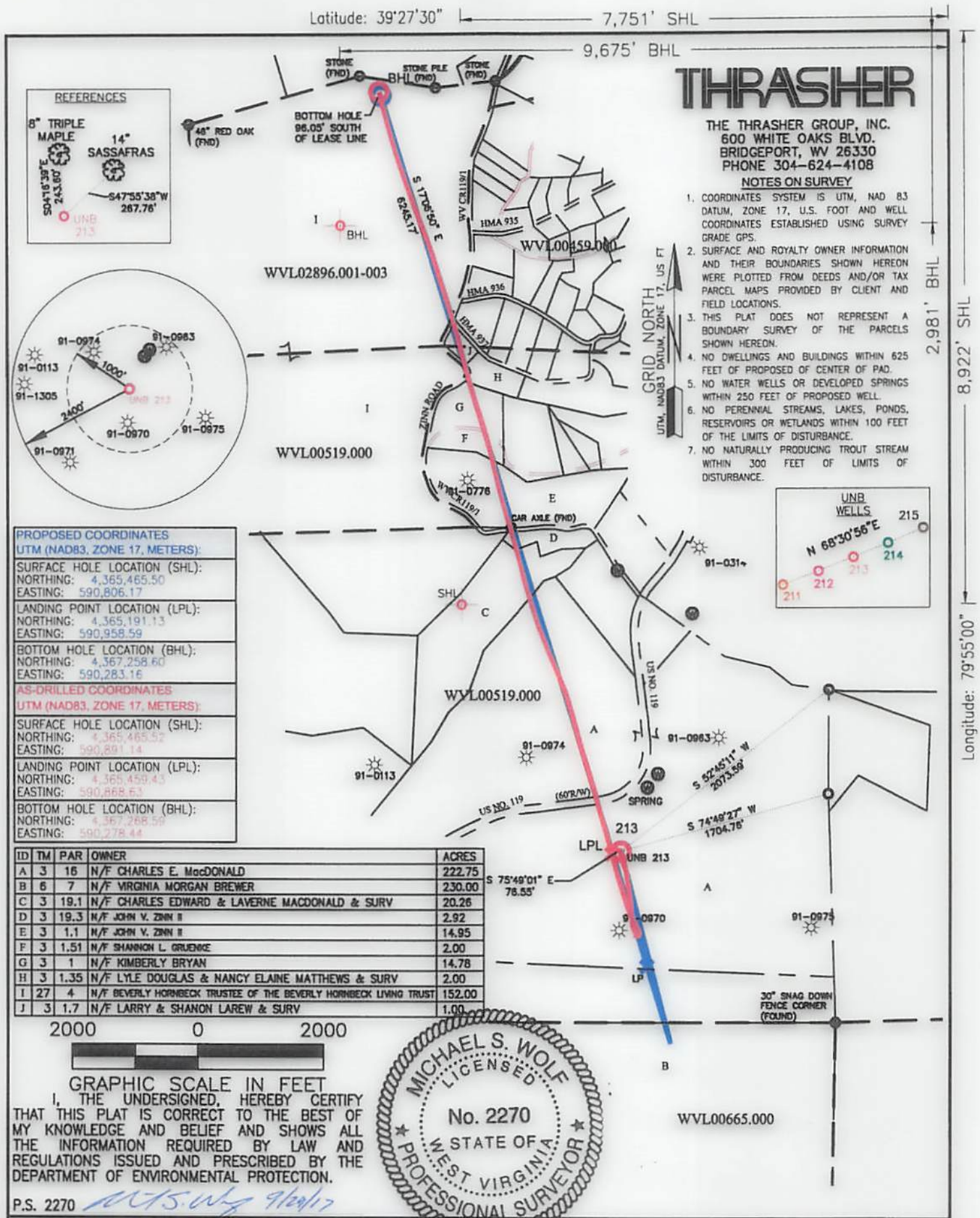

THRASHER

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.

PROPOSED COORDINATES UTM (NAD83, ZONE 17, METERS):
SURFACE HOLE LOCATION (SHL): NORTHING: 4,365,465.50 EASTING: 590,806.17
LANDING POINT LOCATION (LPL): NORTHING: 4,365,191.13 EASTING: 590,958.59
BOTTOM HOLE LOCATION (BHL): NORTHING: 4,367,258.60 EASTING: 590,283.16
AS-DRILLED COORDINATES UTM (NAD83, ZONE 17, METERS):
SURFACE HOLE LOCATION (SHL): NORTHING: 4,365,465.52 EASTING: 590,891.14
LANDING POINT LOCATION (LPL): NORTHING: 4,365,459.43 EASTING: 590,868.63
BOTTOM HOLE LOCATION (BHL): NORTHING: 4,367,268.59 EASTING: 590,278.44

ID	TM	PAR	OWNER	ACRES
A	3	16	N/F CHARLES E. MacDONALD	222.75
B	6	7	N/F VIRGINIA MORGAN BREWER	230.00
C	3	19.1	N/F CHARLES EDWARD & LAVERNE MACDONALD & SURV	20.26
D	3	19.3	N/F JOHN V. ZINN II	2.92
E	3	1.1	N/F JOHN V. ZINN II	14.95
F	3	1.51	N/F SHANNON L. GRUENKE	2.00
G	3	1	N/F KIMBERLY BRYAN	14.78
H	3	1.35	N/F LYLE DOUGLAS & NANCY ELAINE MATTHEWS & SURV	2.00
I	27	4	N/F BEVERLY HORNBECK TRUSTEE OF THE BEVERLY HORNBECK LIVING TRUST	152.00
J	3	1.7	N/F LARRY & SHANON LAREW & SURV	1.00

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. 213

API WELL #: 47 (STATE) 091 (COUNTY) 01329 (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: ± 679.61 (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: 7,983 TVD 14,700 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 10:53AM