

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

API 47-091-01331 County Taylor District Fetterman  
Quad Gladesville Pad Name UNB Field/Pool Name \_\_\_\_\_  
Farm name MacDonald, Charles E. Well Number 215  
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 4365469.05 Easting 590899.52  
Landing Point of Curve Northing 4365959.85 Easting 591127.25  
Bottom Hole Northing 4367498.49 Easting 590639.01

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 05/30/2017 Date drilling ceased 06/09/2017  
Date completion activities began 8/10/2017 Date completion activities ceased 9/07/2017  
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

**Reviewed**  
*Amber L. Reynolds*  
1-7-18

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Reviewed by: *JBL* JAN 8 2018  
03/02/2018  
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API 47-091 - 01331 Farm name MacDonald, Charles E. Well number 215

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"	500'	New	54.50	120'	Y
Coal							
Intermediate 1	12 1/4"	9 5/8"	1,530'	New	40.00	NA	Y
Intermediate 2							
Intermediate 3							
Production	8 1/2"	5 1/2"	13,742'	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 <sup>3</sup> /sks)	Volume (ft <sup>3</sup> )	Cement Top (MD)	WOC (hrs)
Conductor	A	230	15.6	1.2	276	Surface	8+
Surface	A	480	15.60	1.20	576	Surface	8+
Coal							
Intermediate 1	A	150/340	15.2/15.7	1.26/1.3	189/442	Surface	8+
Intermediate 2							
Intermediate 3							
Production	A	1240/1250	13.80/15.00	1.37/1.29	1698/1612	1350'	8+
Tubing							

Drillers TD (ft) 13,750ft 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 7,084', 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 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 1,800' to surface.

WAS WELL COMPLETED AS SHOT HOLE  Yes  No DETAILS Completed 27 stages, 1080 perforations

WAS WELL COMPLETED OPEN HOLE?  Yes  No DETAILS \_\_\_\_\_

WERE TRACERS USED  Yes  No TYPE OF TRACER(S) USED \_\_\_\_\_

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PRODUCING FORMATION(S)	DEPTHS			
Marcellus Shale	7890	TVD	8343	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 <sub>2</sub> S, ETC)
Sand/silt	0	7539	0	7800	Sand/silt
Burket	7539	7617	7800	7890	Shale
Tully	7617	7708	7890	8010	Limestone
Mahantango	7708	7875	8010	8309	Shale
Marcellus	7875	7890	8309	8343	Shale
Purcell	7890	7896	8343	8359	Limestone
Lower Marcellus	7896	7739	8359	13750	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 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

WV Department of  
Environmental Protection  
03/02/2018

# Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	8/10/2017
Job End Date:	9/7/2017
State:	West Virginia
County:	Taylor
API Number:	47-091-01331-00-00
Operator Name:	Arsenal Resources
Well Name and Number:	UNB 215H
Latitude:	39.43397300
Longitude:	-79.94378100
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	7,985
Total Base Water Volume (gal):	13,785,954
Total Base Non Water Volume:	0



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## 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	89.14946	None
Sand (Proppant)	Keane	Proppant					
			Crystalline silica: Quartz (SiO2)	14808-60-7	100.00000	10.33904	None
Hydrochloric Acid (7.5%)	Keane	Acid Inhibitor					
			Water	7732-18-5	92.50000	0.34904	None
KFR-16FW	Keane	Friction Reducer					
			Hydrochloric Acid	7647-01-0	7.50000	0.02830	None
			Water	7732-18-5	60.00000	0.06494	None
			Distillates (petroleum), hydrotreated light	64742-47-8	20.00000	0.02165	None
			ammonium chloride	12125-02-9	1.50000	0.00162	None
MBC-516	Keane	Biocide					
			oleic acid diethanolamide	93-83-4	1.50000	0.00162	None
			alcohols, C12-16, ethoxylated	68551-12-2	1.00000	0.00108	None
			Water	7732-18-5	56.70000	0.00519	None
			Glutaral	111-30-8	26.70000	0.00244	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	0.00452	None
KAI-12	Keane	Acid Inhibitor					
			Ethylene glycol	107-21-1	40.00000	0.00068	None
			dipropylene glycol, monomethyl ether	34590-94-8	20.00000	0.00034	None
			Cinnamaldehyde	104-55-2	10.00000	0.00017	None
			formic acid	64-18-6	10.00000	0.00017	None
			Ethoxylated alcohol	68131-39-5	10.00000	0.00017	None
			Tar bases, quinoline derivs., benzyl chloride-quaternized	72480-70-7	10.00000	0.00017	None
			isopropyl alcohol	67-63-0	5.00000	0.00009	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	0.34904	
			Distillates (petroleum), hydrotreated light	64742-47-8	20.00000	0.02165	
			Glutaral	111-30-8	26.70000	0.00244	
			ammonium chloride	12125-02-9	1.50000	0.00162	
			oleic acid diethanolamide	93-83-4	1.50000	0.00162	
			alcohols, C12-16, ethoxylated	68551-12-2	1.00000	0.00108	
			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 glycol, monomethyl ether	34590-94-8	20.00000	0.00034	
			ethonal	64-17-5	2.80000	0.00026	
			Tar bases, quinoline derivs., benzyl chloride-quaternized	72480-70-7	10.00000	0.00017	
			formic acid	64-18-6	10.00000	0.00017	
			Ethoxylated alcohol	68131-39-5	10.00000	0.00017	
			Cinnamaldehyde	104-55-2	10.00000	0.00017	
			isopropyl alcohol	67-63-0	5.00000	0.00009	
			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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Latitude: 39°27'30" 7,723' SHL

# THRASHER

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

**NOTES ON SURVEY**

- COORDINATES SYSTEM IS UTM, NAD 83 DATUM, ZONE 17, U.S. FOOT AND WELL COORDINATES ESTABLISHED USING SURVEY DATA.
- 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.
- THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARCELS SHOWN HEREON.
- NO DWELLINGS AND BUILDINGS WITHIN 625 FEET OF PROPOSED CENTER OF PAD.
- NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF PROPOSED WELL.
- NO PERENNIAL STREAMS, LAKES, PONDS, RESERVOIRS OR WETLANDS WITHIN 100 FEET OF THE LIMITS OF DISTURBANCE.
- NO NATURALLY PRODUCING TROUT STREAM WITHIN 300 FEET OF LIMITS OF DISTURBANCE.

8102707E0

PROPOSED COORDINATES UTM (NAD83, ZONE 17, METERS):	
SURFACE HOLE LOCATION (SHL): NORTHING: 4,365,469.05 EASTING: 590,899.52	
LANDING POINT LOCATION (LPL): NORTHING: 4,365,828.26 EASTING: 591,174.30	
BOTTOM HOLE LOCATION (BHL): NORTHING: 4,367,481.38 EASTING: 590,635.97	
AS-DRILLED COORDINATES UTM (NAD83, ZONE 17, METERS):	
SURFACE HOLE LOCATION (SHL): NORTHING: 4,365,469.05 EASTING: 590,899.52	
LANDING POINT LOCATION (LPL): NORTHING: 4,365,959.85 EASTING: 591,127.25	
BOTTOM HOLE LOCATION (BHL): NORTHING: 4,367,498.49 EASTING: 590,639.01	

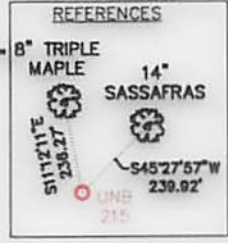
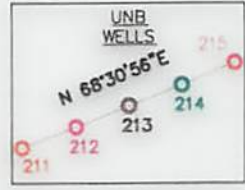
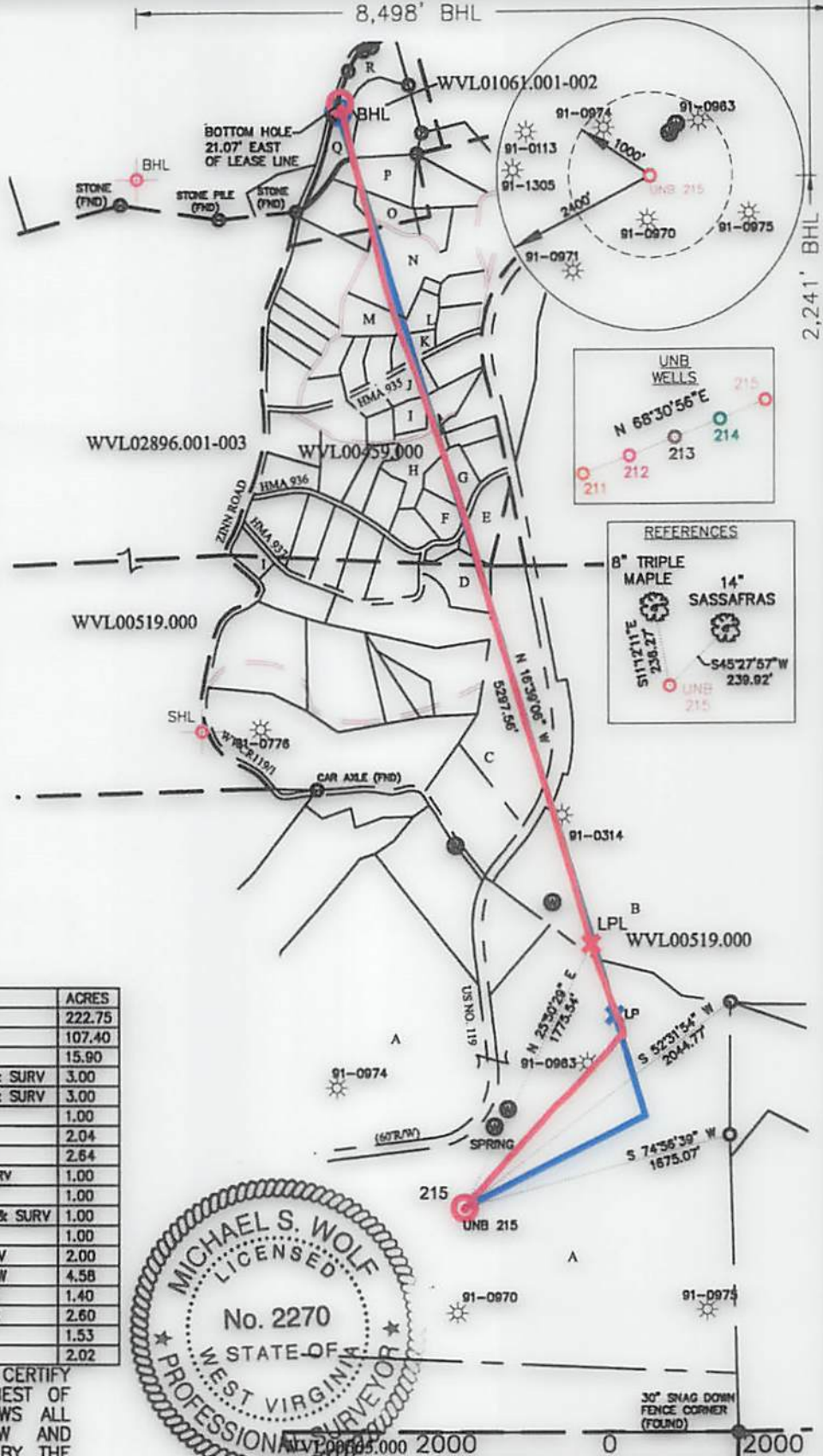
ID	TM	PAR	OWNER	ACRES
A	3	16	N/F CHARLES E. MacDONALD	222.75
B	3	15.2	N/F RANDY L. ERVIN	107.40
C	3	15	N/F WILLIAM J. LOGAR	15.90
D	3	1.10	N/F RANDALL & KIMBERLY MCNEELY & SURV	3.00
E	3	1.4	N/F RAYMOND C. & SUSAN J. DERK & SURV	3.00
F	3	1.36	N/F DERRICK M. CAMPBELL	1.00
G	3	1.37	N/F BRADLEY A. BARILL HEIRS	2.04
H	3	1.45	N/F RICKY A. & LISA M. BENNETT & SURV	2.64
I	3	1.17	N/F KENNETH & CHARLOTTE JOHNSTON & SURV	1.00
J	3	1.11	N/F HAYWARD J. MCCAULEY II	1.00
K	3	1.21	N/F JOSEPH E. & KARAN L. KINSLEY & SURV	1.00
L	3	1.33	N/F CHRISTINE M. ROUTLEDGE	1.00
M	3	1.47	N/F DAVID & MICHELLE ROYCE & SURV	2.00
N	1	5	N/F JACOB S. & SARAH BARTHOLOMEW	4.58
O	27	5.6	N/F BERNARD N. & EVA R. PETERSON	1.40
P	27	5.4	N/F RICHARD J. & SHASTA D. SHRIVER	2.60
Q	27	5.10	N/F GEORGE PALMIERI	1.53
R	27	5.2	N/F ALBERT & LESA R. REITZ	2.02

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 *Michael S. Wolf* 9/29/17



GRAPHIC SCALE IN FEET



	(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS	MINIMUM DEGREE OF ACCURACY: 1/200	UNB NO. 215
	WVDEP OFFICE OF OIL & GAS 601 57TH STREET CHARLESTON, WV 25034	PROVEN SURVEY SOURCE OF ELEVATION: GRADE GPS (NAVD 88, US FT)	OPERATOR'S WELL #: 47 API WELL #: 091
WELL TYPE: OIL WASTE DISPOSAL PRODUCTION DEEP GAS LIQUID INJECTION STORAGE SHALLOW	WATERSHED: WHITE DAY CREEK	ELEVATION: 1878'	QUADRANGLE: GLADESVILLE 7.5'
DISTRICT: FETTERMAN COUNTY: TAYLOR	SURFACE OWNER: CHARLES MacDONALD	ACREAGE: ± 222.75	ACREAGE: ± 375.88 (LEASE)
OIL & GAS ROYALTY OWNER: JP MORGAN	DRILL DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION	CONVERT PLUG & ABANDON CLEAN OUT & REPLUG OTHER CHANGE <input checked="" type="checkbox"/> (SPECIFY) AS-DRILLED	ESTIMATED DEPTH: 7,902 TVD 13,750 TMD
TARGET FORMATION: MARCELLUS SHALE	WELL OPERATOR: ARSENAL RESOURCES ADDRESS: 6031 WALLACE ROAD EXTENSION #300 CITY: WEXFORD STATE: PA ZIP CODE: 15090	DESIGNATED AGENT: WILLIAM VEIGEL ADDRESS: 65 PPROFESSIONAL PLACE, SUITE 200 CITY: BRIDGEPORT STATE: WV ZIP CODE: 26330	REVISIONS: _____ DATE: 09-29-2017
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	DRAWN BY: R.DOERR SCALE: 1" = 2000' DRAWING NO: XXXXX WELL LOCATION PLAT	

Longitude: 79°55'00"