



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

Jim Justice, Governor
Austin Caperton, Cabinet Secretary
www.dep.wv.gov

PERMIT MODIFICATION APPROVAL
Horizontal 6A / Horizontal 6A Well - 1

MOUNTAINEER KEYSTONE, LLC
6031 WALLACE RD EXT, STE 300

WEXFORD , PA 15090

Re: Permit Modification Approval for UNB 211
47-091-01325-00-00

Extending lateral to 7,004 feet

MOUNTAINEER KEYSTONE, 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: UNB 211
Farm Name: MACDONALD, CHARLES E.
U.S. WELL NUMBER: 47-091-01325-00-00
Horizontal 6A / Horizontal 6A Well - 1
Date Issued: 3/29/2017

Promoting a healthy environment.

03/31/2017

Mountaineer Keystone



March 24, 2017


Office of Oil and Gas
Attn: Laura Adkins
601 57th Street SE
Charleston, WV 25304

Dear Ms. Adkins:

Enclosed please find the modification for the UNB 211 permit (API 47-9101325). This well was originally permitted to 5,845.79ft. The modification is to extend the lateral to 7,004ft. We have obtained an additional lease for this modification, lease WVL00665.000. I have enclosed the revised plat, revised WW-6B form, and revised WW-6A1.

Please let me know if you have any questions or need any additional information.

Thanks,



Kelly Eddy
Permitting Specialist
1-304-517-8743 mobile
1-724-940-1218 office
keddy@arsenalresources.com

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STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: Mountaineer Keystone, LLC 494501227 Taylor Fetterman Gladesville 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: 211 Well Pad Name: UNB

3) Farm Name/Surface Owner: Charles E. MacDonald Public Road Access: Rt. 119

4) Elevation, current ground: 1882.05' Elevation, proposed post-construction: 1878.25'

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

6) Existing Pad: Yes or No no

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale, 7877' (Top), 7958' (Bottom), 81', 0.5psi/ft

8) Proposed Total Vertical Depth: 7958'

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 15,697

11) Proposed Horizontal Leg Length: 7,004

12) Approximate Fresh Water Strata Depths: 350'

13) Method to Determine Fresh Water Depths: Offsetting wells reported water depths (091-00113, 091-00776, 091-00958, 091-00963, 091-00970)

14) Approximate Saltwater Depths: 910'

15) Approximate Coal Seam Depths: Bakerstown 30', Upper Freeport 218', Lower Freeport 290', Upper Kittanning 345', Middle Kittanning 388', Lower Kittanning 438'

16) Approximate Depth to Possible Void (coal mine, karst, other): None known

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes _____ No

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

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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#	500'	500'	CTS
Coal							
Intermediate	9.625"	New	J-55	40#	1500'	1500'	CTS
Production	5.5"	New	P-110	20#	15,697'	15,697'	TOC @ 1,350' MD
Tubing							
Liners							

Ernest L. Reynolds 3-24-17

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	Type 1, 3% Calcium	1.20
Fresh Water	13.375"	17.5"	0.38"	2730	0	Class A, 3% CaC12	1.20
Coal							
Intermediate	9.625"	12.25"	0.395"	3950 psi	0	Class A, 2% CaC12	1.29
Production	5.5"	8.5-8.75	0.361"	12,640 psi	9500	Type 1	1.64/1.32
Tubing					5000		
Liners					N/A		

PACKERS

Kind:				
Sizes:				
Depths Set:				

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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 grout 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 1/2" 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- 1/4" intermediate hole to the programmed depth, run 9- 5/8" casing and cement to surface. The rig will then continue to drill a 8- 3/4" hole to a designed KOP and then start drilling the curve and lateral section to the programmed total measured depth, run 5 1/2" 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): 16.3

22) Area to be disturbed for well pad only, less access road (acres): 5.9

23) Describe centralizer placement 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 1,600' to surface.

24) Describe all cement additives associated with each cement type:

24" will be grouted from 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 Type 1 cement, & no greater than 3% calcium chloride. The 5-1/2" production string will be cemented back to 1,350' (+/- 200' above the casing shoe for the 9-5/8") with Type 1 or Class A cement retarder (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 a 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 to 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 to 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 stands and load the hole. The weight indicator on the rig will be monitored for any occurrences of drag and if any are notices, we will re-run the previous stand of pipe pulled across and circulate 2X bottoms up while watching the shakers for signs of cuttings. Once at the base of the 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. **RECEIVED**
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*Note: Attach additional sheets as needed.

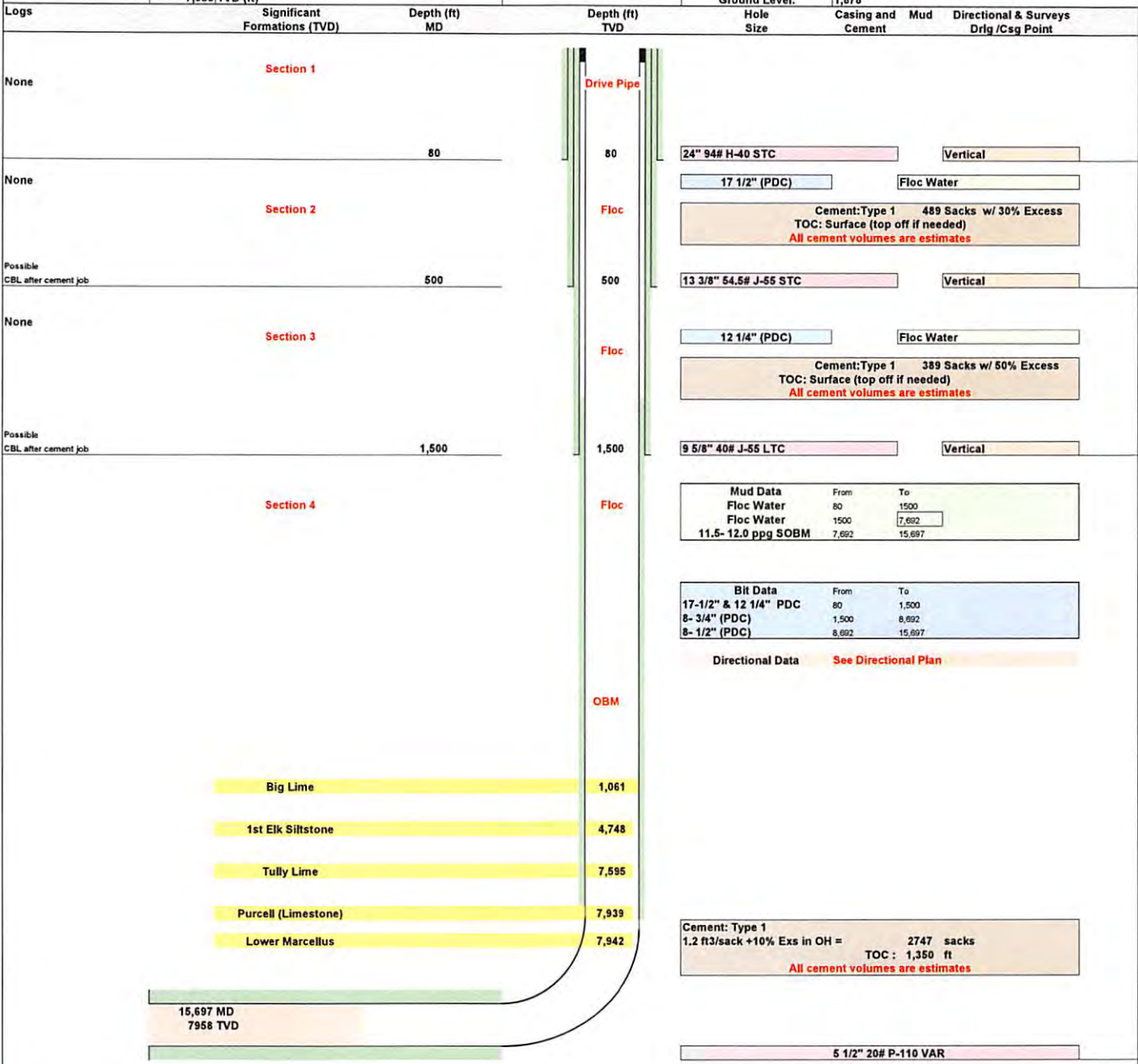
MAR 28 2017



Mountaineer Keystone
UNB 211HM
Casing Design
Directional Plan # 2 ADC

Other Names:	N/A
Surface Location:	TBD
Bottom Hole Location:	TBD
Total Depth:	15,697 MD (ft) 7,958 TVD (ft)

County:	Taylor		
State:	West Virginia		
AFE #:	XX	API #:	XX
RKB:	27		
Ground Level:	1,878		



Revision 1

Note: Not drawn to scale

Cement Outside Casing
Seal Assembly in Annulus

Date Last Revised: 21-Mar-17
Jarrett Toms

KLG 3-24-17

03/31/2017

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
See Attached List				

**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: Mountaineer Keystone, LLC
 By: Eddie Carder *E.C.*
 Its: Permitting Manager **RECEIVED**
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Attachment to WW-6A1, UNB No. 211HM

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
WVL00519.000	Union National Bank, Trustee - Truman E. Gore and C. Burke Morris	Pepper Resources, Inc.	12.50%	44/70	907
	Pepper Resources, Inc.	Petroleum Development Corporation		19/440 31/28	
	Petroleum Development Corporation	PDC Mountaineer, LLC		30/698	
	PDC Mountaineer, LLC	PDC Mountaineer Holdings, LLC			
WVL00665.000	Virginia M. Brewer, widow	Petroleum Development Corporation	12.50%	58/349	763.776
	Petroleum Development Corporation	PDC Mountaineer, LLC		31/267	
	Virginia M. Brewer	PDC Mountaineer, LLC		63/559	
	PDC Mountaineer, LLC	PDC Mountaineer Holdings, LLC			
WVL02896.001	Ronald L. and Beverly Hornbeck, H/W	Chesapeake Appalachia, L.L.C.	12.50%	1021/314 1064/301	152
	Chesapeake Appalachia, L.L.C.	Statoilhydro USA Onshore Properties, Inc.		34/738	
	Chesapeake Appalachia, LLC and Statoil USA Onshore Properties, Inc.	PDC Mountaineer, LLC		45/677	
	PDC Mountaineer, LLC	PDC Mountaineer Holdings, LLC			
WVL02896.002	Cara Michelle Davidson, a/k/a Cara Michelle Krauch	Chesapeake Appalachia, L.L.C.	12.50%	1072/754	152
	Chesapeake Appalachia, L.L.C.	Statoilhydro USA Onshore Properties, Inc.			
	Chesapeake Appalachia, LLC and Statoil USA Onshore Properties, Inc.	PDC Mountaineer, LLC		45/677	
	PDC Mountaineer, LLC	PDC Mountaineer Holdings, LLC			
WVL02896.003	Beth Mays a/k/a Catherine Elizabeth (Beth) Mays	Chesapeake Appalachia, L.L.C.	15.00%	1070/137	152
	Chesapeake Appalachia, L.L.C.	Statoilhydro USA Onshore Properties, Inc.			
	Chesapeake Appalachia, LLC and Statoil USA Onshore Properties, Inc.	PDC Mountaineer, LLC		45/677	
	PDC Mountaineer, LLC	PDC Mountaineer Holdings, LLC			

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Agreement to Drill, Complete and Operate Oil & Gas Wells


This Agreement to Drill, Complete and Operate Oil & Gas Wells (this "Agreement"), by and among Mountaineer Keystone LLC, a West Virginia limited liability company ("Mountaineer Keystone"), PDC Mountaineer, LLC, a Delaware limited liability company ("PDC"), and PDC Mountaineer Holdings, LLC, a Delaware limited liability company ("PDC Holdings"), is effective as of October 15, 2014. (the "Effective Date") and sets forth the terms pursuant to which Mountaineer Keystone will drill, complete and operate the Wells (as defined below) on behalf of PDC and PDC Holdings. Mountaineer Keystone, PDC, and PDC Holdings are each a "Party" and are collectively the "Parties". In consideration of the foregoing and the respective agreements hereinafter set forth and the mutual benefits to be derived therefrom, the Parties, intending to be legally bound, hereby agree as follows:

1. **Term:** This Agreement is effective from the Effective Date until terminated by Mountaineer Keystone on the one hand or PDC and PDC Holdings on the other hand with 30 days' written notice to the other Party or Parties, as applicable (the "Term").
2. **Authorization to Operate:** PDC and PDC Holdings authorize Mountaineer Keystone to undertake and perform, on PDC and PDC Holdings behalf, all operations, including without limitation permit applications, well pad preparation, drilling and completing wells, and marketing gas, oil and other hydrocarbons therefrom with respect to all oil and gas wells to be drilled on oil and gas leasehold acreage held by PDC or PDC Holdings. PDC, PDC Holdings and Mountaineer Keystone are affiliates with a common parent. Mountaineer Keystone was formed to operate oil and gas leasehold acreage held by PDC, PDC Holdings and certain other affiliates. Mountaineer Keystone agrees that it shall, in a good and workmanlike manner and in accordance with industry standards as they prevail in the area, drill, complete and operate oil and gas wells on leasehold acreage owned by PDC or PDC Holdings from time to time as directed by PDC or PDC Holdings (collectively, the "Wells").
3. **No Third Party Beneficiary:** This Agreement is for the benefit of the Parties and is not for the benefit of any third party.
4. **Counterparts:** This Agreement may be simultaneously executed in several counterparts and via facsimile or similar electronic transmittal, each of which shall be deemed to be an original and taken together shall constitute one and the same instrument.

[Signature Page Follows]

IN WITNESS WHEREOF, Mountaineer Keystone, PDC, and PDC Holdings have caused their duly authorized representatives to execute this Agreement as of the Effective Date.


MOUNTAINEER KEYSTONE LLC

By: 
Name: Robert Kozel
Title: CEO

PDC MOUNTAINEER, LLC

By: 
Name: Robert Kozel
Title: CEO

PDC MOUNTAINEER HOLDINGS, LLC

By: 
Name: Robert Kozel
Title: CEO

MOUNTAINEER KEYSTONE, LLC
WELL NO. UNB 211

NOTES:
-PLAT ORIENTATION, CORNERS, AND WELL REFERENCES ARE BASED UPON THE GRID NORTH MERIDIAN FOR THE WV STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD 27. WELL LOCATION REFERENCE TIES ARE BASED UPON THE MAGNETIC MERIDIAN.
-THERE APPEARS TO BE 1 WATER WELL LOCATED WITHIN 1000' OF WELL UNB 211.
○ = IRON ROD FOUND UNLESS OTHERWISE NOTED

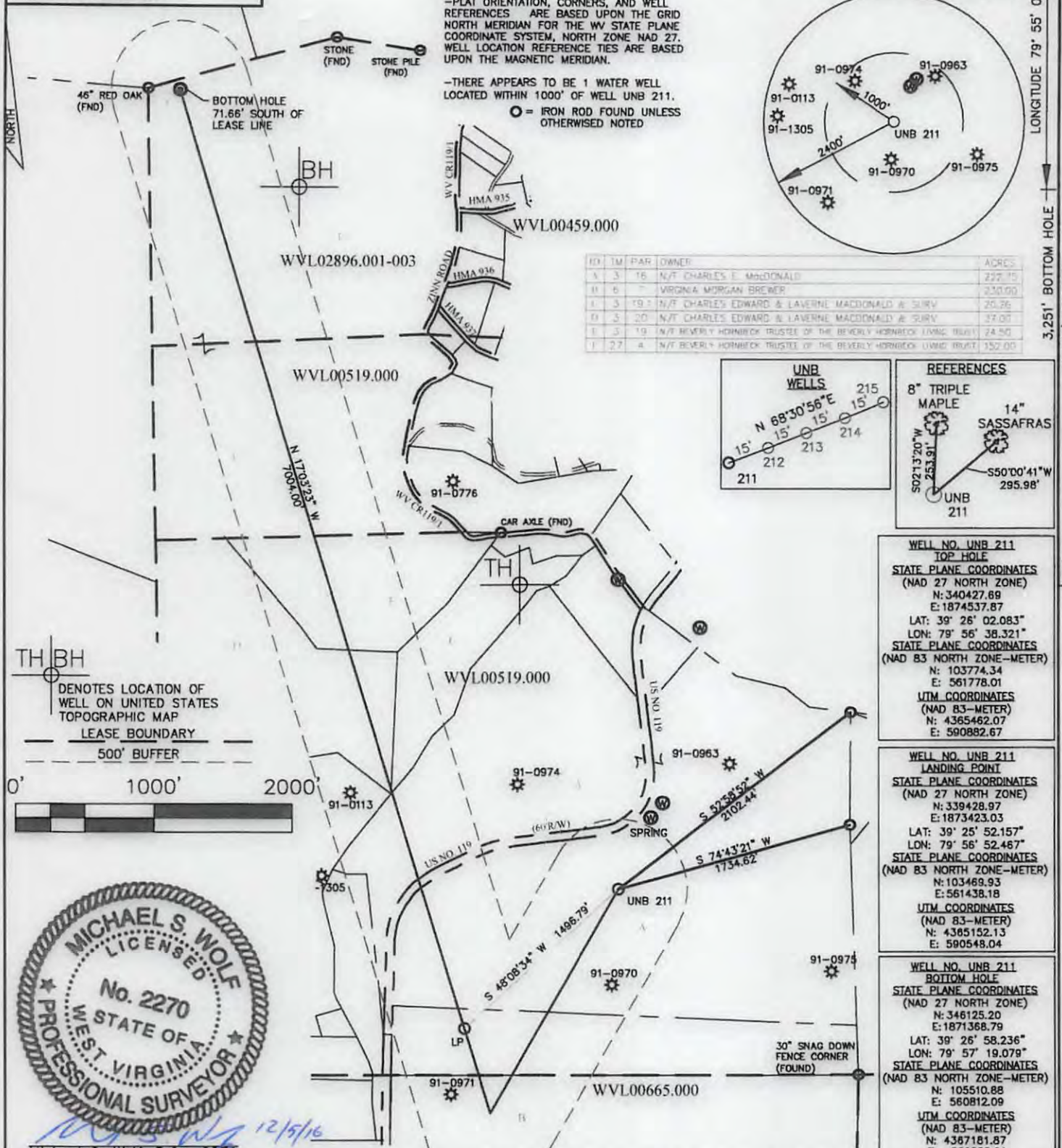
7,779' TOP HOLE

10,974' BOTTOM HOLE

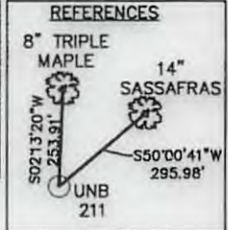
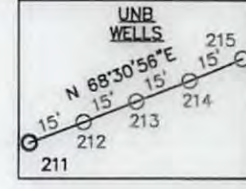
LATITUDE 39° 27' 30"

LONGITUDE 79° 55' 00"

3,251' BOTTOM HOLE
8,933' TOP HOLE



ID	TM	PAR	OWNER	ACRES
A	3	16	N/T CHARLES E. MACDONALD	227.75
M	6	7	VIRGINIA MORGAN BREWER	230.00
I	3	19	N/T CHARLES EDWARD & LAVERNE MACDONALD & SURV	20.26
M	3	20	N/T CHARLES EDWARD & LAVERNE MACDONALD & SURV	27.00
I	3	19	N/T BEVERLY HORNBECK TRUSTEE OF THE BEVERLY HORNBECK LIVING TRUST	24.50
I	2	4	N/T BEVERLY HORNBECK TRUSTEE OF THE BEVERLY HORNBECK LIVING TRUST	152.00

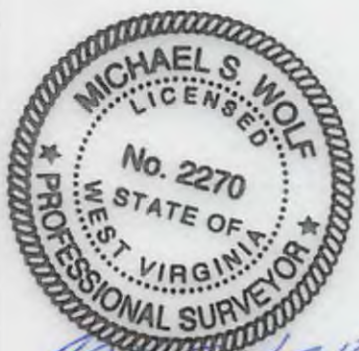
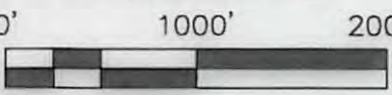


WELL NO. UNB 211
TOP HOLE
STATE PLANE COORDINATES (NAD 27 NORTH ZONE)
N: 340427.89
E: 1874537.87
LAT: 39° 26' 02.083"
LON: 79° 56' 38.321"
STATE PLANE COORDINATES (NAD 83 NORTH ZONE-METER)
N: 103774.34
E: 561778.01
UTM COORDINATES (NAD 83-METER)
N: 4365462.07
E: 590882.67

WELL NO. UNB 211
LANDING POINT
STATE PLANE COORDINATES (NAD 27 NORTH ZONE)
N: 339428.97
E: 1873423.03
LAT: 39° 25' 52.157"
LON: 79° 56' 52.487"
STATE PLANE COORDINATES (NAD 83 NORTH ZONE-METER)
N: 103469.93
E: 561438.18
UTM COORDINATES (NAD 83-METER)
N: 4365152.13
E: 590548.04

WELL NO. UNB 211
BOTTOM HOLE
STATE PLANE COORDINATES (NAD 27 NORTH ZONE)
N: 346125.20
E: 1871368.79
LAT: 39° 26' 58.236"
LON: 79° 57' 19.079"
STATE PLANE COORDINATES (NAD 83 NORTH ZONE-METER)
N: 105510.88
E: 560812.09
UTM COORDINATES (NAD 83-METER)
N: 4367181.87
E: 589888.21

TH BH
DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAP
LEASE BOUNDARY
500' BUFFER



Michael S. Wolf, P.S. 2270

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.

FILE NO. <u>030-1999</u>	DATE <u>DECEMBER 05</u> 2016
SCALE: <u>1"=1000'</u>	OPERATOR'S WELL NO. <u>UNB NO. 211</u>
MINIMUM DEGREE OF ACCURACY: <u>1 in 2500</u>	API WELL NO.
PROVEN SOURCE OF ELEVATION: <u>OPUS SURVEY GRADE GPS</u>	<u>47</u> - <u>091</u> - <u> </u>
	STATE COUNTY PERMIT
WELL TYPE: OIL <input type="checkbox"/> GAS <input checked="" type="checkbox"/> LIQUID INJECTION <input type="checkbox"/> WASTE DISPOSAL <input type="checkbox"/> (IF "GAS"), PRODUCTION <input checked="" type="checkbox"/> STORAGE <input type="checkbox"/> DEEP <input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> LOCATION: ELEVATION: <u>1878'</u> WATER SHED: <u>WHITE DAY CREEK</u> DISTRICT: <u>FETTERMAN</u> COUNTY: <u>TAYLOR</u> QUADRANGLE: <u>GLADESVILLE 7.5'</u> ACREAGE: <u>222.75 AC±</u> SURFACE OWNER: <u>CHARLES E. MacDONALD</u> LEASE ACREAGE: <u>686.51 AC +</u> OIL & GAS ROYALTY OWNER: <u>JP MORGAN</u> LEASE NO. <u> </u>	
PROPOSED WORK: DRILL <input checked="" type="checkbox"/> CONVERT <input type="checkbox"/> DRILL DEEPER <input type="checkbox"/> REDRILL <input type="checkbox"/> FRACTURE OR STIMULATE <input checked="" type="checkbox"/> PERFORATE NEW FORMATION <input type="checkbox"/> PLUG OFF OLD FORMATION <input type="checkbox"/> OTHER PHYSICAL CHANGE IN WELL (SPECIFY) <u> </u>	
PLUG AND ABANDON <u> </u> CLEAN OUT AND REPLUG <u> </u> TARGET FORMATION: <u>MARCELLUS SHALE</u> ESTIMATED DEPTH: <u>7,958' TVD / 15,697' MD</u>	
WELL OPERATOR: <u>MOUNTAINEER KEYSTONE</u> ADDRESS: <u>6031 WALLACE ROAD Ex., SUITE 300</u> <u>WEXFORD, PA 15090</u>	DESIGNATED AGENT: <u>NATHAN SKEEN</u> ADDRESS: <u>65 PROFESSIONAL PLACE, SUITE 200</u> <u>BRIDGEPORT, WV 26330</u>



03/31/2017