



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304
(304) 926-0450
(304) 926-0452 fax

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

PERMIT MODIFICATION APPROVAL

February 14, 2014

ANTERO RESOURCES APPALACHIAN CORPORATION
1625 17TH STREET, SUITE 300
DENVER, CO 80202

Re: Permit Modification Approval for API Number 1706253 , Well #: CHARTER UNIT 1H
Changed Orientation of Lateral

Oil and Gas Operator:

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.

Please call James Martin at 304-926-0499, extension 1654 if you have any questions.

Sincerely,

for

Gene Smith

Regulatory/Compliance Manager
Office of Oil and Gas



November 1, 2013

Antero Resources
1625 17th Street
Denver, Colorado 80202
Office 303.357.7310
Fax 303.357.7315

West Virginia Department of Environmental Protection
Office of Oil and Gas
Attn: Ms. Laura Cooper
601 57th Street
Charleston, WV 25304

Ms. Laura Cooper:

Antero Resources Corporation (Antero) would like to submit the following permit modification for an approved well on the Powell Pad. We are requesting to modify the horizontal lateral orientation which will change the bottom hole location of the Charter Unit 1H (API# 47-017-06253).

Attached you will find the following documents:

- REVISED Form WW-6B, which shows the revised MD and Production Casing/Cement program
- REVISED Form WW-6A1, which shows the leases we will be drilling into
- REVISED Mylar Plat, which shows the new bottom hole location

If you have any questions please feel free to contact me at (303) 357-7323.

Thank you in advance for your consideration.

Sincerely,

Ashlie Mihalcin
Permit Representative
Antero Resources Corporation

Enclosures

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Office of Oil and Gas
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Environmental Protection

02/21/2014

WW-6B
(9/13)

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

1) Well Operator: Antero Resources Corporation 494488557 017- Doddridge Grant Smithburg 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Charter Unit 1H Well Pad Name: Powell Pad (Existing)

3) Farm Name/Surface Owner: Dennis H. & Mellie Powell Public Road Access: CR 50/34

4) Elevation, current ground: 881' Elevation, proposed post-construction: 881'

5) Well Type (a) Gas Oil Underground Storage
Other

(b) If Gas Shallow Deep
Horizontal

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus Shale: 6800' TVD, Anticipated Thickness- 55 Feet, Associated Pressure- 2950#

8) Proposed Total Vertical Depth: 6800' TVD

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 15,700' MD

11) Proposed Horizontal Leg Length: 7281'

12) Approximate Fresh Water Strata Depths: 105'

13) Method to Determine Fresh Water Depths: Neely Unit 2H (API#47-017-06080) on same pad

14) Approximate Saltwater Depths: 1216'

15) Approximate Coal Seam Depths: 154', 236', 273'

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

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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(9/13)

18) CASING AND TUBING PROGRAM

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	20"	New	H-40	94#	40'	40'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/ 48#	350'	350'	CTS, 486 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2570'	2570'	CTS, 1046 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	15700'	15700'	3880 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		6900'	
Liners							

OK for SW

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	24"	0.438"	1530	Class A	1.18
Fresh Water	13-3/8"	17-1/2"	0.38"/0.33"	2730/1730	Class A	1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	Class A	1.18
Intermediate						
Production	5-1/2"	8-3/4" & 8-1/2"	0.361"	12630	Lead-H/POZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11200		
Liners						

PACKERS

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

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WW-6B
(9/13)

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Antero plans to pump Slickwater into the Marcellus Shale formation in order to ready the well for production. The fluid will be comprised of approximately 99 percent water and sand, with less than 1 percent special-purpose additives as shown in the attached "List of Anticipated Additives Used for Fracturing or Stimulating Well."

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 6.08 existing acres

22) Area to be disturbed for well pad only, less access road (acres): 3.12 existing acres

23) Describe centralizer placement for each casing string:

Conductor: no centralizers
 Surface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th joint spaced up the hole to surface.
 Intermediate Casing: one centralizer above float joint, one centralizer 5' above float collar and one every 4th collar to surface.
 Production Casing: one centralizer at shoe joint and one every 3 joints to top of cement in intermediate casing.

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

Conductor: no additives, Class A cement.
 Surface: Class A cement with 2% calcium and 1/4 lb flake, 5 gallons of clay treat
 Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat
 Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C-51
 Production: Tail cement- Class H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20

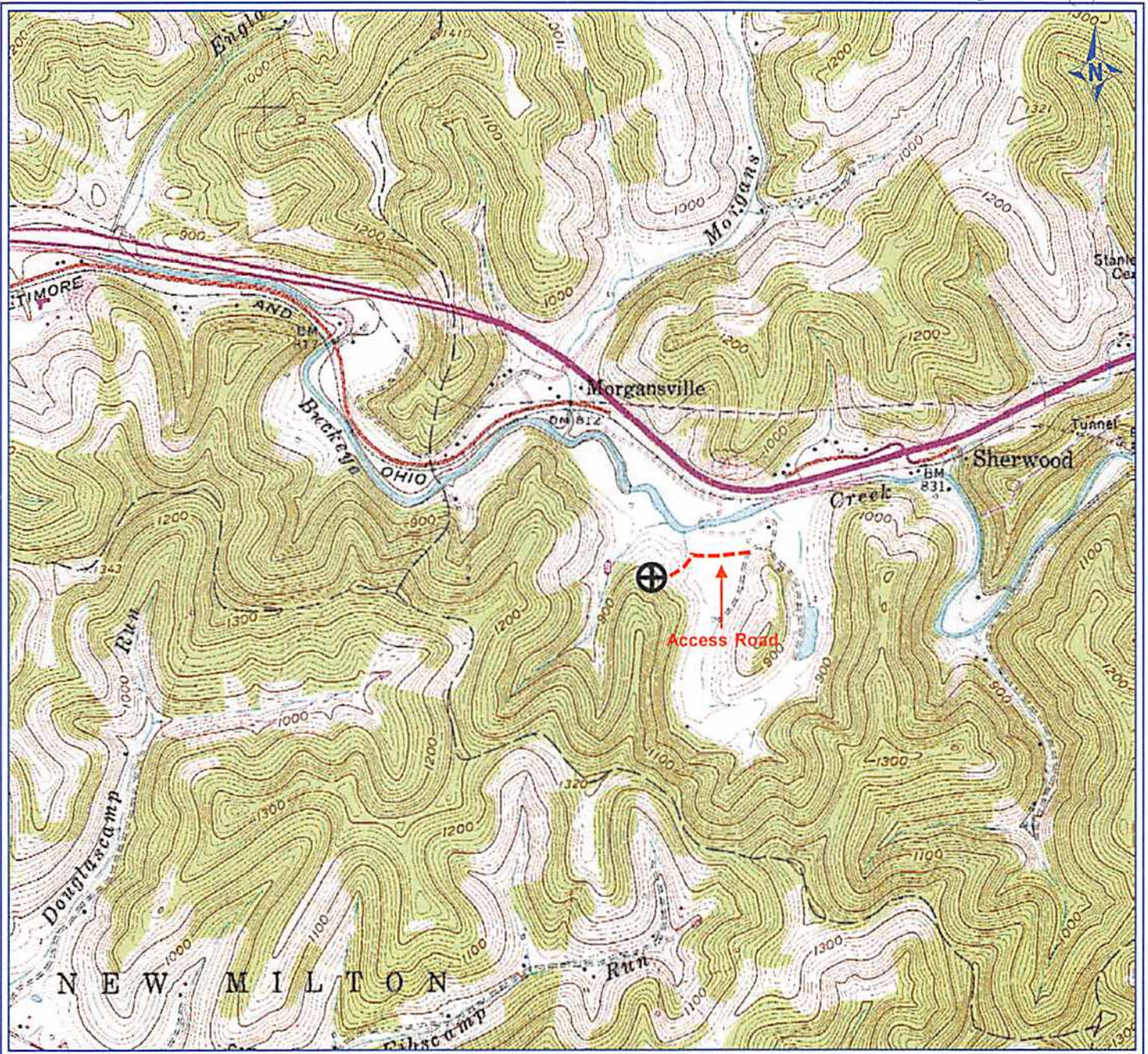
25) Proposed borehole conditioning procedures:

Conductor: blowhole clean with air, run casing, 10 bbls fresh water.
 Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.
 Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.
 Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve, pump high viscosity sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing, circulate 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

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*Note: Attach additional sheets as needed.



PETRA 3/1/2012 1:18:12 PM

Antero Resources Corporation

APPALACHIAN BASIN

Charter Unit 1H

Doddridge County

REMARKS

QUADRANGLE: SMITHBURG
WATERSHED: BUCKEYE CREEK
DISTRICT: GRANT



March 1, 2012

02/21/2014

LATITUDE 39°17'30"

6,913' TO TOP HOLE

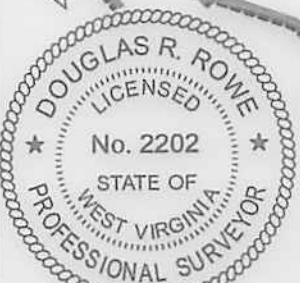
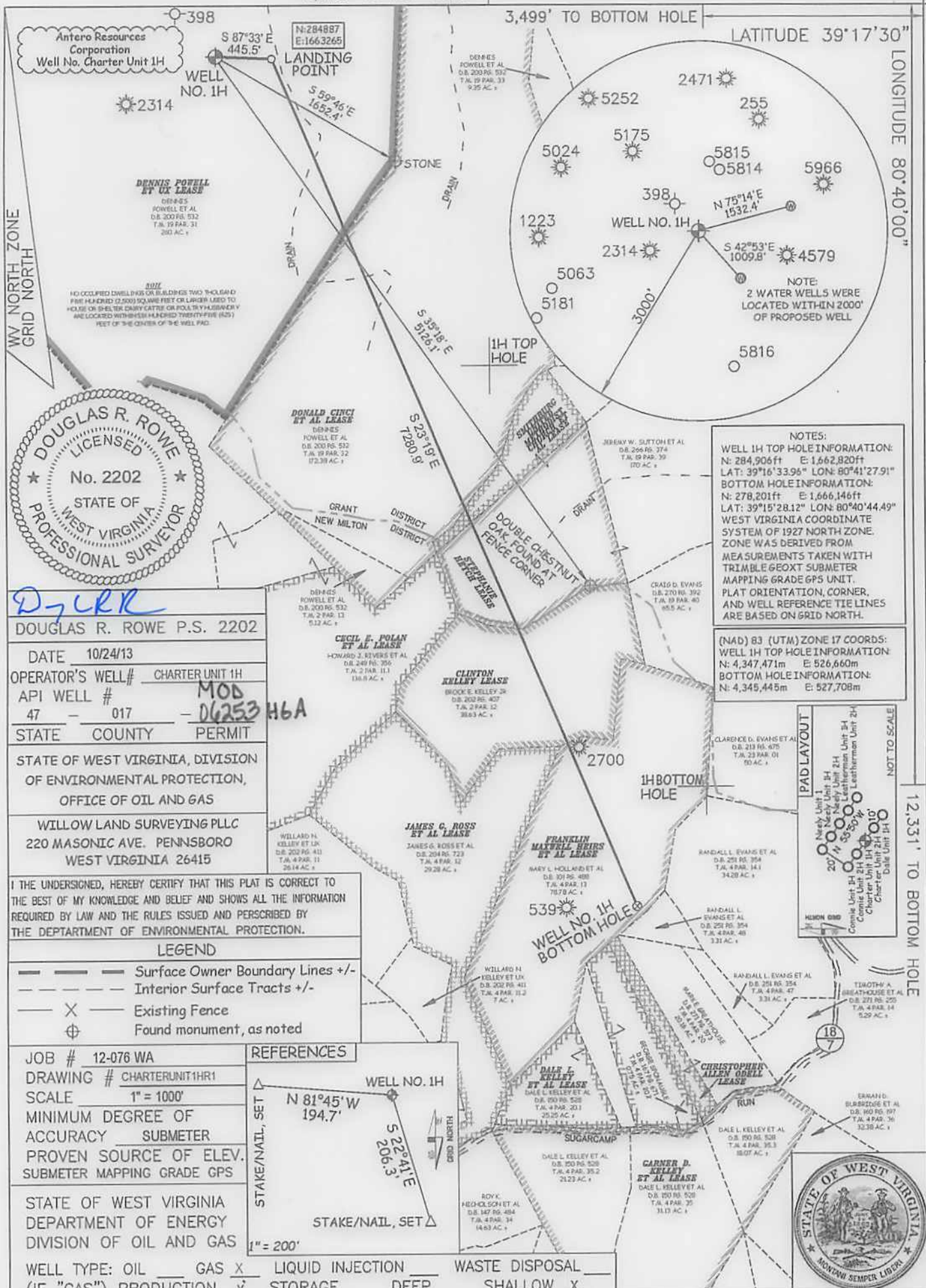
3,499' TO BOTTOM HOLE

LATITUDE 39°17'30"

LONGITUDE 80°40'00"

5,671' TO TOP HOLE

12,331' TO BOTTOM HOLE



D. Rowe
DOUGLAS R. ROWE P.S. 2202

DATE 10/24/13

OPERATOR'S WELL# CHARTER UNIT 1H

API WELL # MOD 47 - 017 - 06253 H6A

STATE COUNTY PERMIT

STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

WILLOW LAND SURVEYING PLLC
220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415

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 RULES ISSUED AND PERSCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

LEGEND

- Surface Owner Boundary Lines +/-
- - - Interior Surface Tracts +/-
- X Existing Fence
- ⊕ Found monument, as noted

JOB # 12-076 WA
DRAWING # CHARTERUNIT1HR1
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

REFERENCES



STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS

WELL TYPE: OIL ___ GAS LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION STORAGE ___ DEEP ___ SHALLOW
LOCATION: ELEVATION 881' WATERSHED BUCKEYE CREEK DISTRICT GRANT COUNTY DODDRIDGE

QUADRANGLE SMITHBURG 7.5'

SURFACE OWNER	DENNIS H. AND MELLIE POWELL	ACREAGE	260 ACRES +/-
OIL & GAS ROYALTY OWNER	DENNIS POWELL ET UX; DONALD CINCI ET AL; SMITHBURG UNITED METHODIST CHURCH ET AL	LEASE ACREAGE	260.5 AC; 187.5 AC; 10 AC;
	STEPHANIE HETCH; CLINTON KELLEY; FRANKLIN MAXWELL HIERS ET AL		40 AC; 38.375 AC; 85 AC
PROPOSED WORK:	DRILL <input checked="" type="checkbox"/> CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE <input checked="" type="checkbox"/> PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION <input checked="" type="checkbox"/>		
OTHER PHYSICAL CHANGE IN WELL (SPECIFY)	BHL - Modification		
PLUG & ABANDON ___ CLEAN OUT & REPLUG ___	ESTIMATED DEPTH	6,800' TVD 15,700' MD	
TARGET FORMATION	MARCELLUS		
WELL OPERATOR	ANTERO RESOURCES CORP.	DESIGNATED AGENT	DIANNA STAMPER
ADDRESS	1625 17TH STREET DENVER, CO 80202	ADDRESS	CT CORPORATION SYSTEM 5400 D BIG TYLER ROAD CHARLESTON, WV 25313

NOTES:
WELL 1H TOP HOLE INFORMATION:
N: 284,906ft E: 1,662,820ft
LAT: 39°16'33.96" LON: 80°41'27.91"
BOTTOM HOLE INFORMATION:
N: 278,201ft E: 1,666,146ft
LAT: 39°15'28.12" LON: 80°40'44.49"
WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE 660XT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

(NAD) 83 (UTM) ZONE 17 COORDS:
WELL 1H TOP HOLE INFORMATION:
N: 4,347,471m E: 526,660m
BOTTOM HOLE INFORMATION:
N: 4,345,445m E: 527,708m



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