

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

Harold D. Ward, Cabinet Secretary www.dep.wv.gov

Wednesday, December 20, 2023 PERMIT MODIFICATION APPROVAL Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION 1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for Castilow 1H

47-017-06965-00-00

Lateral Extension

ANTERO RESOURCES CORPORATION

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: Castilow 1H

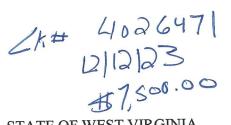
Farm Name: Susan Haught Gido, et al

U.S. WELL NUMBER: 47-017-06965-00-00

Horizontal 6A New Drill Date Modification Issued: 12/20/2023

Promoting a healthy environment.

WW-6B (04/15)



API NO. 47-017 - 06965
OPERATOR WELL NO. Castilow Unit 1H MOD
Well Pad Name: Haught Pad

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

1) Well Operator: Antero Resources Corporat 494507062 017-Doddrid New Milt New Milton 7.5' Operator ID County District Quadrangle
2) Operator's Well Number: Castilow Unit 1H MOD / Well Pad Name: Haught Pad
3) Farm Name/Surface Owner: Susan Haught Gido, et al Public Road Access: Brushy Fork Road
4) Elevation, current ground: Elevation, proposed post-construction: 1194'
5) Well Type (a) Gas X Oil Underground Storage
Other
(b)If Gas Shallow X Deep
Horizontal X
6) Existing Pad: Yes or No Yes
7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s): 2023 Marcellus Shale: 7700' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2850#
2) Proceed Total Vertical Depth: 7700' TVD
9) Formation at Total Vertical Depth: Marcellus
10) Proposed Total Measured Depth: 26600' MD
45007.41
11) Proposed Horizontal Leg Length.
12) Approximate Fiesh water Strata Depths.
13) Method to Determine Fresh water Depths.
14) Approximate Saltwater Depths: 2406'
15) Approximate Coal Seam Depths: None Anticipated
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 _X
(a) If Yes, provide Mine Info: Name:
Depth:
Seam:
Owner:

ΔΡ	IN	IO.	47-	017	-	06965

OPERATOR WELL NO. Castilow Unit 1H MOD
Well Pad Name: Haught Pad

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	20"	New	H-40	94#	80	80 /	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	321	321 /	CTS, 334 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2500	2500 /	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	23#	26600	26600 /	5775 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

Inst I. Degrold 12-14-23

ТУРЕ	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	24"	0.438"	1530	50	Class A	~1.18
Fresh Water	13-3/8"	17-1/2"	0.38"	2730	1000	Class A	~1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	1500	Class A	~1.18
Intermediate					-		
Production	5-1/2"	8-3/4" & 8-1/2"	0.415"	12,630 /	2500	Lead-H/POZ & Tall - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

PACKERS

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

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DEC 18 2023

WV Department of Environment Protection

WW-6B	
(10/14)	

API NO. 47- 017 - 06965

OPERATOR WELL NO. Castilow Unit 1H MOD Well Pad Name: Haught Pad

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 specialpurpose additives as shown in the attached "List of Anticipated Additives Used for Fracturing or Stimulating

Anticipated Max Pressure - 9300 lbs Anticipated Max Rate - 80 bpm

- 21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 33.94 acres
- 22) Area to be disturbed for well pad only, less access road (acres): 11.40acres

23) Describe centralizer placement for each casing string:

Surface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th joint spaced up the hole

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:

WV Department of Environmental Protection

Conductor: no additives, Class A cement.

Surface: Class A cement with 2-3% calcium chloride and 1/4 lb of flake

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:

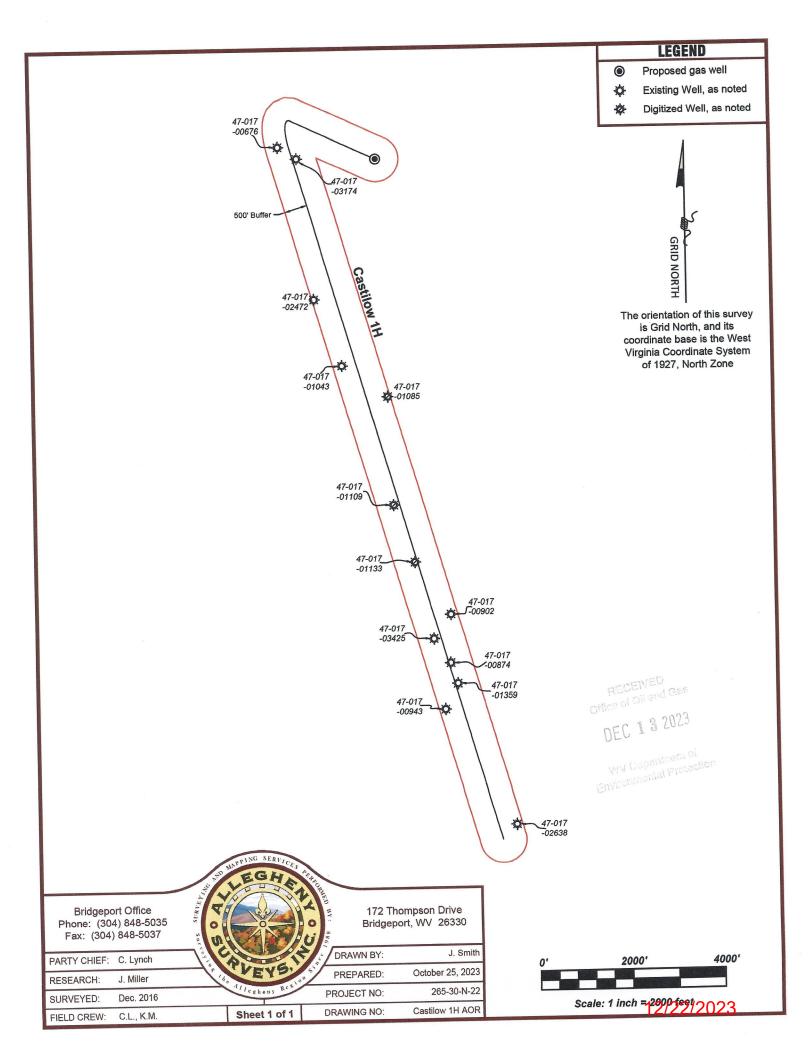
Conductor: blowhole clean with air, run casing, 10 bbls fresh water.

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 400 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.

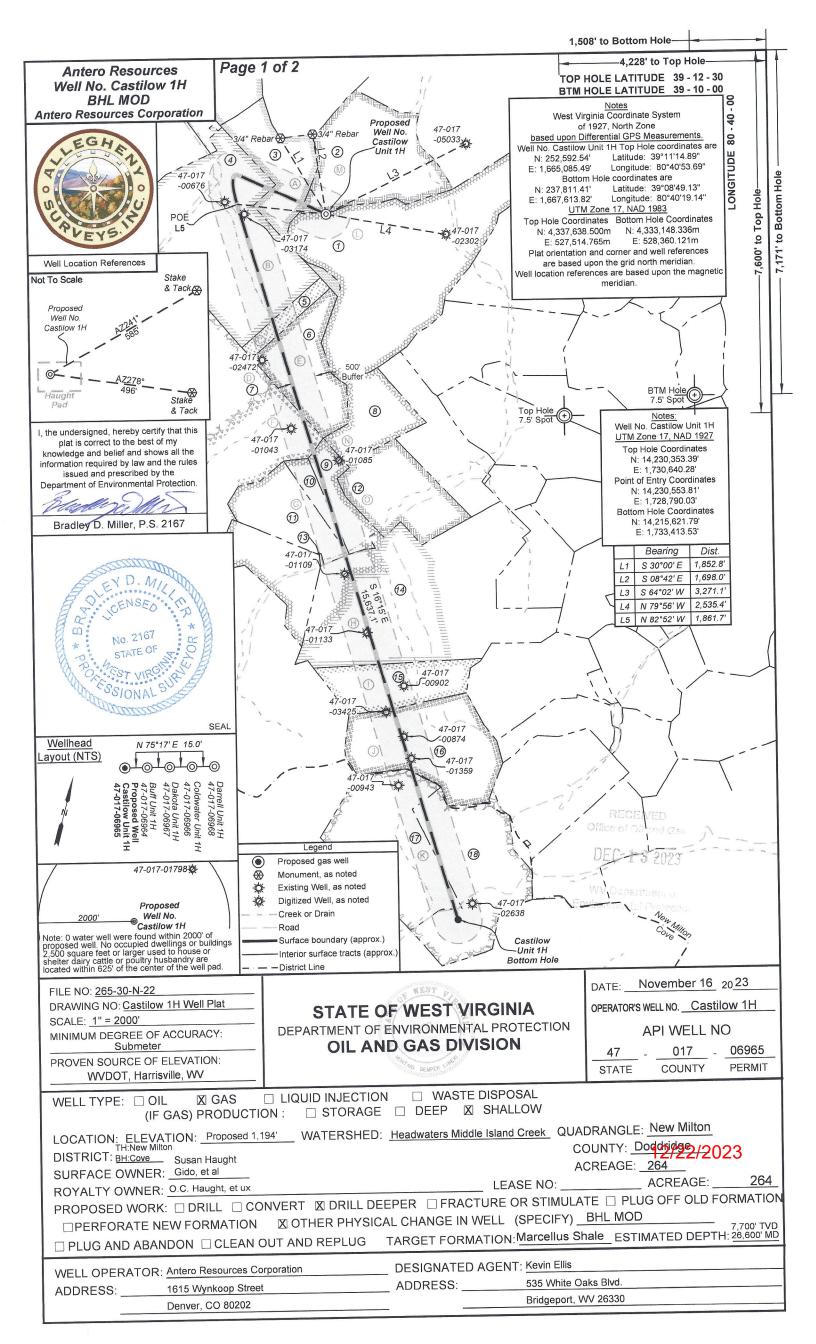
^{*}Note: Attach additional sheets as needed.



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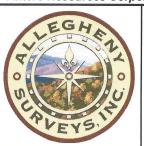
		Well Number	Operator	Historical Operator	7	Perforated Interval (snallowest, deepest)	religiated contration(s)	
UWI (APINum)	Well Name	Well Nulliper	Operation	COLUMNIA TRIANICIE OII	2 144		Blue Monday, Big Injun	Weir, Benson, Alexander
47017006760000 THOMAS BATTEN HEIRS	S BATTEN HEIRS	2	SOUTHRN TRIANGLE OIL	SOUTHRN TRIANGLE OIL	C, 1,4		Nevander	Weir, Benson, Alexander
7017031740000 COX		B-2	ANTERO RESOURCES CORP	SWIFT ENERGY CO	5,509	5277 - 3294	Alexander	W/Sir
1/01/001/10000 CON			BOSE & WHARTON GAS CO	1 & JENTERPRISES	5,496	4536 - 5304	Riley, Benson, Alexander	AACII
47017024720000 SMITH J M L	ML	K-510-1	RUSS & WHARTON GAS CO	2 00 3 CINI CINI MISCO	2051		Rig Injun Gantz	Weir, Benson, Alexander
47017010430000 STOUT & HINTER	& HINTER	1	TARGA DEVELOPMENT INC	GEARHART F A	1,351		of injury Current	Weir Benson Alexander
	HILLIGEOFF	4	DETROI ELIM PROMOTIONS	PETROLEUM PROMOTIONS	2,460			Well, College, College,
47017010850000 HAUGHI-HANSFURD	I-HANSFURD	-	LEINOTEOIN I ROMO HOUS	CHARLES ON PARTY	2 650			Weir, Benson, Alexander
47017011090000 HENRY AHOUSE	AHOUSE	1-B	CHRISTENSON R W	CHRISTENSON N VV	2,000		0:-1-:	Weir Benson Alexander
ATOT TOT 100000 HENRY A HOUSE HEIRS	A HOLISE HEIRS	ىد	EXCEL ENERGY INC	CHRISTENSON R W	2,249	7777 - 0077	Ols III dii	W. I. D. Alawandar
4/01/01/0110/000		111.4	CEO ENERGY I I C	HORSON PET CORP	2.650	2245 - 2495	Big Lnjun	Well, Bellson, Alexander
47017034250000 CRISLIP ELMER	ELMER	W-I	GEO ENERGI LLC	I COSCINI EL COM	2245		Big Injun	Weir, Benson, Alexander
47017009020000 FLMER CRISLIP ET AL	CRISLIP ET AL	1	PATCHWORK OIL & GAS LLC	CHRISTENSON R W	2,215		0 1 1 2 1 1	Weir Benson Alexander
CTELL O	CTATON	2	PATCHWORK OIL & GAS LLC	GEARHART F A	2,274		Big injun	well, believely mentals
4/01/008/40000 SIELLA SEVENIN	SEVENIN	7	The Course Cours		2 520		Rio Iniun	Weir, Benson, Alexander
47017013590000 STELLA SEVERN	SEVERN	5	PATCHWORK OIL & GAS LLC	CHRISTENSON R W	2,539		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Weir Benson Alexander
0000510005105			BERRY ENERGY INC	SOUTHRN TRIANGLE OIL	2,581		DIS IIIJUII	1100
47017036380000 GIMINIWIFASE	WIFASE	1	GEO ENERGY LLC	GEO ENERGY LLC		4998 - 5318	Alexander	Well, Bellson



Antero Resources Well No. Castilow 1H BHL MOD

Page 2 of 2

Antero Resources Corporation



WAS TO SELECT	
	Leases
Α	Franklin Maxwell Heirs, LP
В	Denver Cox, et ux
С	Ralph Lee & Deloris Cox
D	Jack E. & Dorothea Webber
Е	Kenneth R. Mason, et ux
F	Frank Hinter, et al
G	O.C.Haught, et al
Н	O.C.Haught, et al
-	Embra D. White
J	AMP IV, LP
K	H.B. Gum, et ux
L	O.C. Haught, et ux
M	Haught Family Trust
N	Mary K. Post
IN	Revocable Trust - 2017, et al
Ω	Mary K. Post
J	Revocable Trust - 2017, et al

-	-		-	
ID	TM-Par	Owner	Bk/Pg	Acres
1	15-15	Susan Haught Gido, et al	WB62/407	264.00
2	15-6	Susan Haught Gido, et al	WB62/407	119.23
3	15-5	David E. Bowyer, et al	389/715	64.00
4	15-14	Ralph & Deloris Cox	223/187	207.50
5	15-16	Ralph & Deloris Cox	223/187	15.25
6	15-17	Denver W., Jr. & Mary Beth Cox	223/185	69.21
7	15-13	Harold J. Hastings	174/74	346.16
8	15-18	Susan Haught Gido, et al	WB62/407	37.39
9	19-4.2	Eileen Squitiro	183/341	29.84
10	19-4.1	Paul Eisenkramer	171/515	12.80
11	19-4.3	Luke Squitiro	WB54/253	53.61
12	19-5	Susan Haught Gido, et al	WB62/407	86.26
13	19-4.4	Luke Squitiro	512/497	0.29
14	19-7	Susan Haught Gido, et al	WB62/407	269.50
15	19-19	Rezall M. Crislip, et al	349/484	63.20
16	19-15	AMP IV LP	444/354	108.56
17	6-5	Troy S. Gum	364/465	130.00
18	7-1	Mary Ann Gum	WB30/102	130.00

DEC 1 3 2023

FILE NO: 265-30-N-22
DRAWING NO: Castilow 1H Well Plat
SCALE: 1" = 2000'
MINIMUM DEGREE OF ACCURACY:
Submeter
PROVEN SOURCE OF ELEVATION:

STATE OF WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION OIL AND GAS DIVISION

WEST P

DATE:	November	16	2023	

OPERATOR'S WELL NO. <u>Castilow 1H</u>

API WELL NO

 47
 017
 06965

 STATE
 COUNTY
 PERMIT

WVDOT, Harrisville, WV	AW SELBHER LIBERT	STATE COUNTY PERMIT
	□ LIQUID INJECTION □ WASTE DISPOSAL ON: □ STORAGE □ DEEP ☒ SHALLOW	
LOCATION: ELEVATION: Proposed 1,1	94' WATERSHED: <u>Headwaters Middle Island Creek</u> Q	UADRANGLE: New Milton
TH:New Milton DISTRICT: BH:Cove Susan Haught		COUNTY: <u>Doddridge/22/2023</u>
SURFACE OWNER: Gido, et al		ACREAGE: <u>264</u>
ROYALTY OWNER: O.C. Haught, et ux	LEASE NO: _	ACREAGE:264_
PROPOSED WORK: ☐ DRILL ☐ CO	NVERT 🗵 DRILL DEEPER 🗆 FRACTURE OR STIMU	LATE $\ \square$ PLUG OFF OLD FORMATION
□PERFORATE NEW FORMATION		7) BHL MOD 7,700' TVD
☐ PLUG AND ABANDON ☐ CLEAN C	OUT AND REPLUG TARGET FORMATION: Marcellus	Shale ESTIMATED DEPTH: 26,600 MD
WELL OPERATOR: Antero Resources Col	rporation DESIGNATED AGENT: Kevin Elli	S
ADDRESS: 1615 Wynkoop Street	ADDRESS: 535 White	e Oaks Blvd.
Denver, CO 80202	Bridgepo	t, WV 26330

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 –

- 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:

Applicant claims the right to	extract, produce or many		
Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
O.C. Haught, et ux Lease O.C. Haught, et ux Rockwell Petroleum Company Rockwell Resources LLC Antero Resources Appalachian Corporation	Rockwell Petroleum Company Rockwell Resources LLC Antero Resources Appalachian Corporation Antero Resources Corporation	1/8 Successor of Interest Assignment Name Change	103/367 260/429 267/244 46/523
M: Haught Family Trust Lease Haught Family Trust Bluestone Energy Partners Antero Resources Bluestone, LLC	Bluestone Energy Partners Antero Resources Bluestone, LLC Antero Resources Corporation	1/8 Merge Merged	244/298 288/1 WVSOS
A: Franklin Maxwell Heirs, LP Lease Franklin Maxwell Heirs, LP Key Oil Company Bluestone Energy Partners BEP Merger Sub L.P. Antero Resources Bluestone, LLC	Key Oil Company Bluestone Energy Partners BEP Merger Sub L.P. Antero Resources Bluestone, LLC Antero Resources Corporation	1/8 Assignment Merge Merge Merg e	203/185 238/668 288/1 288/1 WVSOS
Denver Cox, et ux Lease: Denver W. Cox, et ux Swift Energy Company Peake Energy Inc North Coast Energy Eastern Inc EXCO — North Coast Energy Eastern Inc EXCO Resources (WV) Inc EXCO Resources (WV) LLC EXCO Production Company (WV) LLC et al Antero Resources Appalachian Corporation	Swift Energy Company Peake Energy Inc North Coast Energy Eastern Inc EXCO – North Coast Energy Eastern Inc EXCO Resources (WV) Inc EXCO Resources (WV) LLC EXCO Production Company (WV) LLC et al Antero Resources Appalachian Corporation Antero Resources Corporation	1/8 Assignment Name Change Name Change Name Change Merge Merge Assignment Name Change	127/473 180/604 249/343 277/68 WVSOS WVSOS 285/83 285/84 46/253
C: Ralph Lee & Deloris Cox Lease: Ralph Lee & Deloris Cox	Antero Resources Corporation	RECEIVED Office of Oil and G	
E: Kenneth R. Mason, et ux Lease: Kenneth R. Mason, et ux	Antero Resources Corporation	DEC 1 3 2023	
F: Frank Hinter, et al Lease: Frank Hinter, et al Bill D. Vaught Southern Triangle Oil Company Floyd A. Gearhart Bessie O. Gearhart Randy F. Gearhart Antero Resources Appalachian Corporation	Bill D. Vaught Southern Triangle Oil Company Floyd A. Gearhart Bessie O. Gearhart Randy F. Gearhart Antero Resources Appalachian Corporation Antero Resources Corporation	1/8 Assignment Assignment Death Death Assignment Name Change	68/306 68/314 81/203 53/503 80/176 271/216 46/253

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Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
G: O. C. Haught, et al Lease: O.C. Haught, et al A.T. Carr Petroleum Promotions Inc Russell & Scott Inc William A. Scott & Yvonne B. Scott William A. Scott Antero Resources Appalachian Corporation	A.T. Carr Petroleum Promotions Inc Russell & Scott Inc William A. Scott & Yvonne B. Scott William A. Scott Antero Resources Appalachian Corporation Antero Resources Corporation	1/8 Assignment Name Change Assignment Verification of Death Assignment Name Change	72/87 72/87 285/1 280/277 280/277 280/277 46/253
H: O.C. Haught, et al Lease: O.C. Haught, et al A.T. Carr Petroleum Promotions Inc Russell & Scott Inc William A. Scott & Yvonne B. Scott William A. Scott Antero Resources Appalachian Corporation	A.T. Carr Petroleum Promotions Inc Russell & Scott Inc William A. Scott & Yvonne B. Scott William A. Scott Antero Resources Appalachian Corporation Antero Resources Corporation	1/8 Assignment Name Change Assignment Verification of Death Assignment Name Change	72/87 72/87 285/1 280/277 280/277 280/277 46/253
Embra D. White Lease: Embra D. White Floyd A. Gearhart Homer Robinson & Phil Shipp R. Wayne Christenson Hobson Petroleum Corporation Hobson Energy Corporation	Floyd A. Gearhart Homer Robinson & Phil Shipp R. Wayne Christenson Hobson Petroleum Corporation Hobson Energy Corporation Antero Resources Corporation	1/8 Assignment Assignment Assignment Assignment Assignment	77/346 77/499 77/500 126/226 141/725 280/52
J: AMP IV, LP Lease: AMP IV, LP	Antero Resources Corporation	1/8+	511/604

*Cotenancy Utilization - Antero is utilizing the Co-tenancy Modernization and Majority Protection Act to proceed with development of certain royalty owners' interests in this tract.

**Pooling/Unitization – Antero has filed a horizontal well unitization application with the West Virginia Oil and Gas Conservation Commission that seeks to pool certain owners in this tract

^{*}Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

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)

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Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
K. H. B. Gum, et ux Leas	e:			
	H. B. Gum, et ux Rockwell Petroleum Company Carson Petroleum Corporation Devon Energy Corporation Robert R. Jones Continental Petroleum, LLC Antero Resources Appalachian Corporation	Rockwell Petroleum Company Carson Petroleum Corporation Devon Energy Corporation Robert R. Jones Continental Petroleum, LLC Antero Resources Appalachian Corporation Antero Resources Corporation	1/8 Assignment Asssignment Assignment Assignment Assignment Assignment Name Change	114/209 123/820 126/434 178/543 191/128 267/497 46/253

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

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Office of Oil and Gas

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:	Antero Resources Corporation		
By:	Tim Rady	Con Vedy	
Its:	Senior Vice President of Land		

Page 1 of _____