

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

Friday, May 31, 2024 PERMIT MODIFICATION APPROVAL Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION 1615 WYNKOOP STREET

DENVER, CO 80202

Re:

Permit Modification Approval for VANDERHOFF UNIT 1H

47-085-10517-00-00

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: VANDERHOFF UNIT 1H

Farm Name: NELSON MARK HAYHURST

U.S. WELL NUMBER: 47-085-10517-00-00

Horizontal 6A New Drill

Date Modification Issued: 05/31/2024

Promoting a healthy environment.

API NO. 47-085	_ 10517	
OPERATOR V	WELL NO.	Vanderhoff Unit 1H MOD
Well Pad Na	me: Olymp	ius Pad

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

								,	,
1) Well Operator:	Antero	Resource	es Corp	orat	194507062		085 - Ritchi		Ellenboro 7.5'
-,					Operator ID		County	District	Quadrangle
2) Operator's Wel	1 Number	: Vande	rhoff Uni	t 1H N	MOD Well	l Pad	Name: Olym	npus Pad	
3) Farm Name/Su	rface Ow	ner: Nel	son Mark	Hayh	urst Public	Roa	d Access: Lai	mberton R	d
4) Elevation, curre	ent groun	1: 1025	' - AS BUILT	Elev	vation, propo	sed	post-construct	ion:	
5) Well Type (a) Gás	X	Oil			Unde	erground Stora	ige	
	ther)If Gas	Shallov	v X		Deep)			
(1))II Gas	Horizon	-						
6) Existing Pad: Y	es or No								
7) Proposed Targe Marcellus Shale	et Format	ion(s), D	epth(s), A	nticir cknes	oated Thickn s- 55 feet, As	ess a	nd Expected lated Pressure-	Pressure(s): 2850#	
8) Proposed Total	Vertical	Depth:	6700' TV	'D					
9) Formation at T			5.4	ellus					
10) Proposed Tot	al Measur	red Deptl	n: 2660	0' MC) /				
11) Proposed Hor	rizontal L	eg Lengt	h: 1725	6' *	Open to mo	dific	ation at a late	er date	
12) Approximate					173', 230'				
13) Method to De					085011840000, 47085	0663600	000 Offset well records. I	Depths have been a	djusted according to surface elevations
14) Approximate									
15) Approximate	Coal Sea	m Depth	s: N/A						
16) Approximate				al mir	ne, karst, oth	er):	None Anticip	ated	
17) Does Propose directly overlying	ed well lo	cation co	ntain coa	l sean			N	Io X	3
(a) If Yes, prov	ide Mine	Info: N	lame:				Office of Oil	end Gais	· ·
. ,		Г	Depth:				MAY 2 2	2024	
CK#403 \$ 75	1790	S	eam:					1	
\$ 75	00	. ()wner:				WV Departme Environmental P	ent of rotection	
5	14/207	14)	
	2				1		M		

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WW-6B
(04/15)

API NO. 47- 085 - 10517

OPERATOR WELL NO. Vanderhoff Unit 1H MOD

Well Pad Name: Olympus Pad

18)

CASING AND TUBING PROGRAM

ТҮРЕ	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	J-55	94#	100'	100' /	CTS, 96 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	300'	300'	CTS, 313 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	3000'	3000' /	CTS, 1221 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P110-ICY	23#	26600'	26600' /	CTS, 5775 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

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	20"	24"	0.375"	2250	50	Class A/L	~1.18
Fresh Water	13-3/8"	17-1/2"	0.38"	2730	1000	Class A/L	~1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	1500	Class A/L	~1.18
Intermediate							
Production	5-1/2"	8-3/4" & 8-1/2"	0.415"	14,360	2500	Class G/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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API NO. 47- 085 - 10517

OPERATOR WELL NO. Vanderhoff Unit 1H MOD

Well Pad Name: Olympus Pad

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

Drill a new horizontal shallow well into the Marcellus Shale.

*Antero will be air drilling the fresh water string which makes it difficult to determine when fresh water is encountered. Therefore, we have built in a buffer for the casing setting depth which helps to ensure that all fresh water zones are covered.

20) Describe fracturing/stirnulating 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."

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

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 18.11 acres

22) Area to be disturbed for well pad only, less access road (acres): 10.00 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.

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

Conductor: no additives, Class A/L cement.

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

Intermediate: Class A/L 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 G/H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20 Environmental Protection

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.

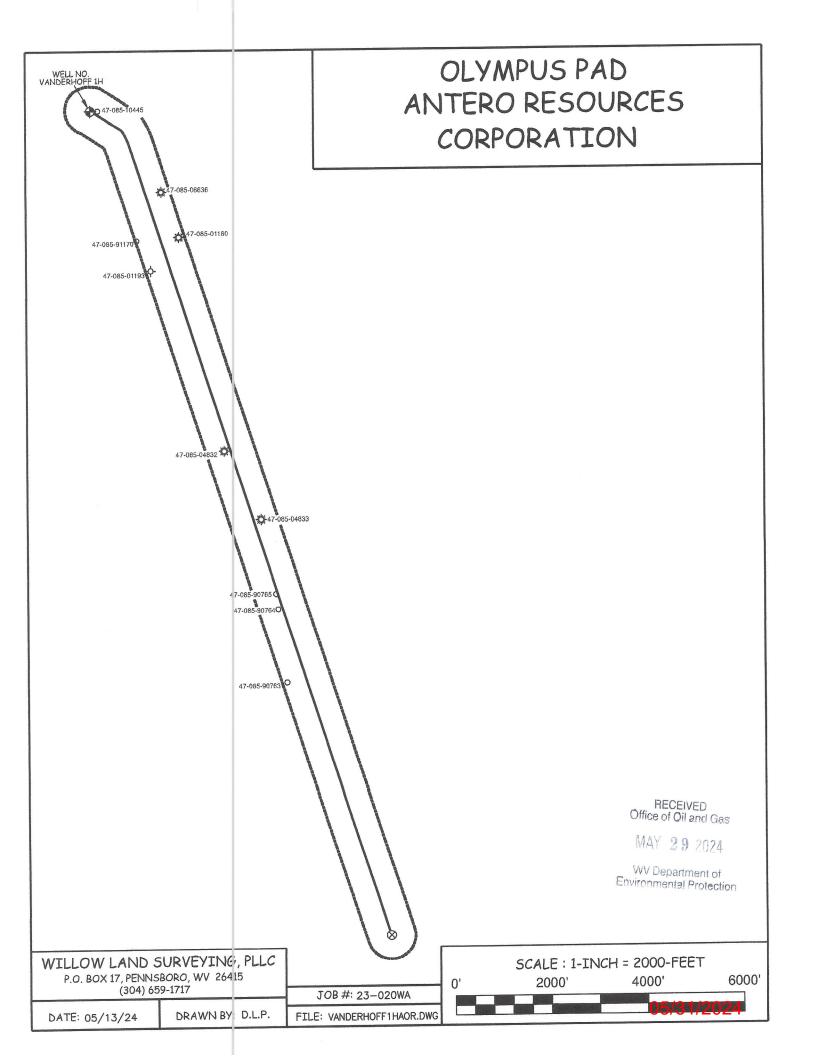
Intermediate: blowhole clean vith air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing,

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 lt/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.

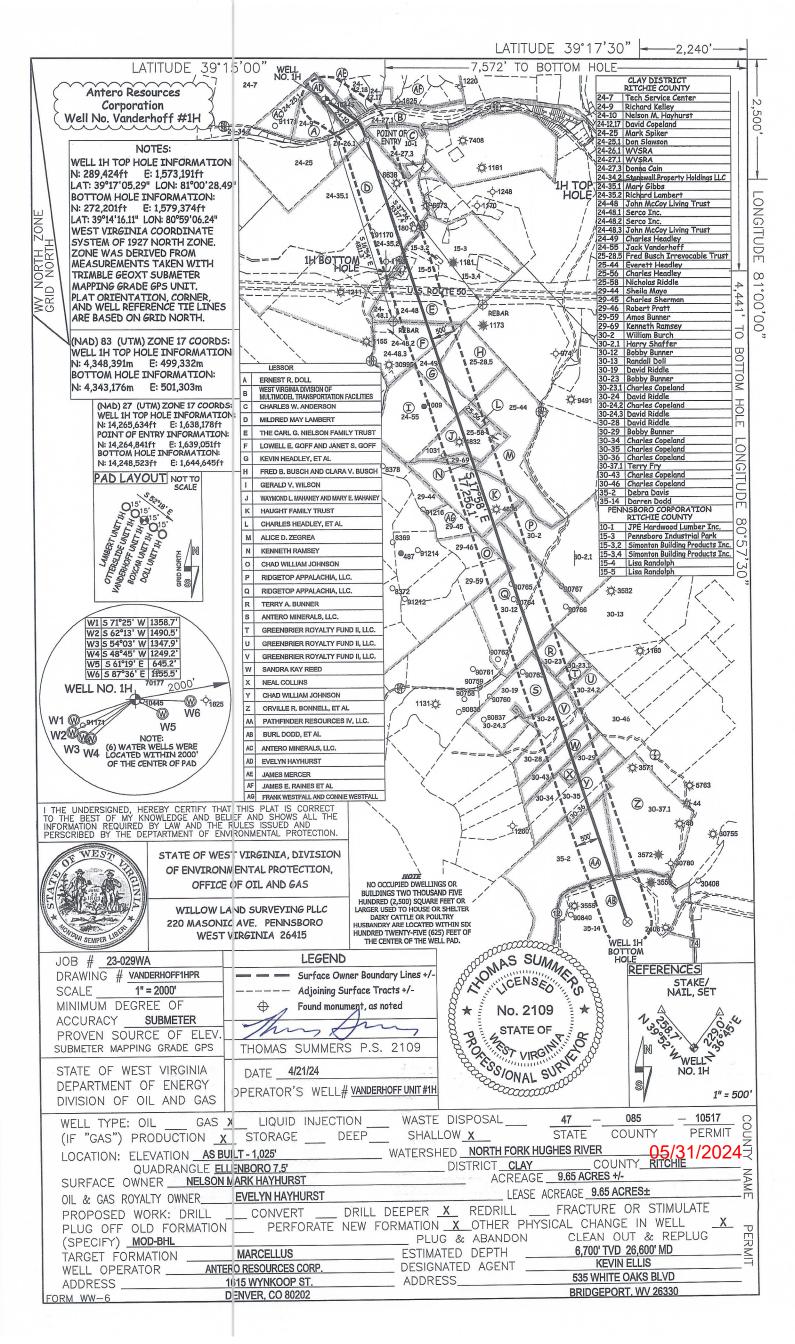
*Note: Attach additional sheets as needed.

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05/31/2024



I IMI (ADINIm)	Well Name	Well Number	Operator	Historical Operator	2	TD Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Producible Formation(s) not perf'd
47085104450000 DIYMPHS LINIT	APLIS UNIT	5V	ANTERO RESOURCES CORP	ANTERO RESOURCES CORP				
17085066360000 IAMBERT MILDRED	RERT MILDRED		MOUNTAINEER GAS TRANSMISSION INC GABLE ALAN OIL DEV		5,514	3577 - 4888	Big Injun, Udev, Lower Huron	Weir, Benson, Alexander, Gordon
7085011800000 L L LAMBERT	AMBERT	2	LAMBERT L L		2,143		Big İnjun	Weir, Benson, Alexander, Gordon
47085911700000								
47085011930000 AMBERT	AMBERT	m	LAMBERT L L	LAMBERT L L	2,169			
A 7085048320000 MAHANEY W FTUX	ANEV W/ FTIIX	1	DEEM J F OIL & GAS LLC	CHASE PETROLEUM CO 6	008'9	1953 - 2866	Big Injun, Weir, Fifth	Weir, Benson, Alexander, Gordon
47085048330000 MAHANEY W R ETAL	HANEY W R ETAL	1	DEEM J F OIL & GAS LLC	CHASE PETROLEUM CO 5	5,500	2058 - 2898	Big Injun, Weir, Gordon	Weir, Benson, Alexander, Gordon
47085907650000								
47085907640000								
77085907630000								



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:

	Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
/	AD: Evelyn Hayhurst Lease Evelyn Hayhurst Antero Resources Appalachian Corporation	Antero Resources Appalachian Corporation Antero Resources Corporation	1/8+ Name Change	0260/0279 0015/0705
/	B: West Virginia Division of Multimodal Transportation Facilities Lease West Virginia Division of Multimodal Transportation Facilities	Antero Resources Corporation	1/8+	0336/0335
/	A: Ernest R. Doll Lease Ernest R. Doll	Antero Resources Corporation	1/8+	0340/0661
	D: Mildred May Lambert Lease Mildred May Lambert Alan Gable Oil Development Co. GasSearch Corporation Linn Energy Holdings, LLC XTO Energy, Inc.	Alan Gable Oil Development Co. GasSearch Corporation Linn Energy Holdings, LLC XTO Energy, Inc/ Antero Resources Corporation	1/8+ Assignment Assignment Assignment	157/0769 0207/0628 0239/0118 0246/0814 0295/0836
1	E: The Carl G. Nielson Family Trust Lease The Carl G. Nielson Family Trust	Antero Resources Corporation	1/8+	0332/0224
/	F: Lowell E. Goff and Janet S. Goff Lease Lowell E. Goff and Janet S. Goff SEP Exploration, LLC	SEP Exploration, LLC Antero Resources Corporation	1/8+ Agreement	0344/0693 0345/0519
/	G: Kevin Headley, Et Al Lease Kevin Headley, Et Al	Antero Resources Corporation	1/8+	0340/0623
/	H: Fred B. Busch and Clara V. Busch Lease Fred B. Busch and Clara V. Busch	Antero Resources Corporation	1/8	0314/0714
	G: Kevin Headley, Et Al Lease Kevin Headley, Et Al	Antero Resources Corporation	1/8+	Office of Oil and Gas
1	I: Gerald V. Wilson Lease Gerald V. Wilson	Antero Resources Corporation	1/8+	MAY 13 20240339/0007
	J: Waymond L. Mahaney and Mary E. Mah Lease Waymond L. Mahaney and Mary E. Mahan J.F. Deem J.F. Deem Oil & Gas, LLC CHK Louisiana, LLC Chesapeake Exploration, LLC SWN Production Company, LLC		1/8 Assignment Assignment Merger Assignment Assignment	WV Department of Environmental Protection 0213/0105 0228/0230 0247/0891 0KSOS 0280/0707 Pooled Tract
	/ N: Kenneth Ramsey Lease Kenneth Ramsey	Antero Resources Corporation	1/8+	0338/0966
				05/24/2024

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	Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
1	K: Haught Family Trust Lease Haught Family Trust	Antero Resources Corporation	1/8+	0339/0004
1	Q: Ridgetop Appalachia, LLC. Lease Ridgetop Appalachia, LLC.	Antero Resources Corporation	1/8+	0339/0126
1	O: Chad William Johnson Lease Chad William Johnson	Antero Resources Corporation	1/8+	0346/0120
1	Q: Ridgetop Appalachia, LLC. Lease Ridgetop Appalachia, LLC.	Antero Resources Corporation	1/8+	0339/0126
1	/ <mark>R: Terry A. Bunner Lease</mark> Terry A. Bunner	Antero Resources Corporation	1/8+	0338/0993
/	S: Antero Minerals, LLC. Lease Antero Resources, LLC.	Antero Resources Corporation	1/8+	0337/0054
/	V: Greenbrier Royalty Fund II, LLC. Lease Greenbrier Royalty Fund II, LLC. SEP Exploration, LLC	SEP Exploration, LLC Antero Resources Corporation	1/8+ Agreement	0344/0437 0345/0519
/	W: Sandra Kay Reed Lease Sandra Kay Reed	Antero Resources Corporation	1/8+	0339/0021
1	X: Neal Collins Lease Neal Collins	Antero Resources Corporation	1/8+	0338/0974
1	Y: Chad William Johnson Lease Chad William Johnson	Antero Resources Corporation	1/8+	0346/0132
,	AA: Pathfinder Resources IV, LLC. Pathfinder Resources IV, LLC. SEP Exploration, LLC	SEP Exploration, LLC Antero Resources Corporation	1/8+ Agreement	0344/0739 0345/0519
			0	RECEIVED ffice of Oil and Gas
			A	MAY 13 2024

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

*Co-tenancy 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.

WV Department of Environmental Protection

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
AB: Burl Dodd, Et Al Lease	Burl Dodd, Et Al Dennis D. Blauser Thomas H. Burrows Cedar Petroleum Donald V. Belatini Blaus er Energy Corporation	Dennis D. Blauser Thomas H. Burrows Cedar Petroleum Donald V. Belatini Blauser Energy Corporation Antero Resources Corporation	1/8 Assignment Assignment Affidavit Assignment Assignment Assignment	0118/0318 0118/0792 0118/0790 0265/0645 0169/0352 0265/0648

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**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.

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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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 Cody	
Its:	Senior Vice President of Land	



May 10, 2024

West Virginia Department of Environmental Protection Office of Oil and Gas Attn: Mr. Taylor Brewer 601 57th Street Charleston, WV 25304 Antero Resources 1615 Wynkoop Street Denver, CO 80202 Office 303.357.7310 Fax 303.357.7315

Mr. Brewer:

Antero Resources Corporation (Antero) would like to submit the following permit modifications for approved well on the existing Olympus Pad: Boxcar Unit 1H (47-085-10515), Doll Unit 1H (47-085-10516), and Vanderhoff Unit 1H (47-085-10517) Expedited.

Attached you will find the following:

- > AOR
- ➤ Revised Form WW-6B
- ➤ Revised Form WW-6A1
- > Revised Mylar Plat

If you have any question; please feel free to contact me at (303) 357-6959.

Thank you in advance for your consideration.

Sincerely,

Stefan Gaspar Permitting Agent

Antero Resources Corporation

Enclosures

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