

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

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Office of Oil and Gas

AUG 10 2020

WV Department of
Environmental Protection

API 47 - 017 - 06456 County Doddridge District Southwest
Quad Oxford 7.5' Pad Name Oxford 13 Pad Field/Pool Name -----
Farm name I.L. Morris Well Number OXFD 13 AHS
Operator (as registered with the OOG) Antero Resources Corporation
Address 1615 Wynkoop Street City Denver State CO Zip 80202

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4335535m Easting 521787m
Landing Point of Curve Northing 4335524.50m Easting 521772.10m
Bottom Hole Northing 4337089m Easting 520801m


Elevation (ft) 1152' 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)
Air - Foam & 4% KCL
Mud - Polymer

Date permit issued 10/12/2018 Date drilling commenced 6/2/2015 Date drilling ceased 6/21/2015
Date completion activities began 3/11/2020 Date completion activities ceased 4/23/2020
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 38' Open mine(s) (Y/N) depths No
Salt water depth(s) ft 1427', 1494', 1827' Void(s) encountered (Y/N) depths No
Coal depth(s) ft 87' Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) No

Reviewed by:

8-14-2020

API 47- 017 - 06456 Farm name I.L. Morris Well number OXFD 13 AHS

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	24"	20"	88'	New	94#, H-40	N/A	Y
Surface	17-1/2"	13-3/8"	1089'	New	48#, H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2844'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	12587'	New	23#, P-110	N/A	Y
Tubing		2-3/8"	7154'		4.7#, N-80		
Packer type and depth set		N/A					

Comment Details _____

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ³ /sks)	Volume (ft ²)	Cement Top (MD)	WOC (hrs)
Conductor	Class A	514 sx	15.6	1.18	120	0'	8 Hrs.
Surface	Class A	361 sx	15.6	1.18	826	0'	8 Hrs.
Coal							
Intermediate 1	Class A	n/a sx	15.6	1.18	1181	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	169 sx (Lead) 2489 sx (Tail)	13.5 (Lead), 15.2 (Tail)	1.53 (Lead), 1.83 (Tail)		-500' into intermediate casing	8 Hrs.
Tubing							

Drillers TD (ft) 12613' MD, 6762' TVD (BHL), 6764' (Deepest Point Drilled) Loggers TD (ft) 12613' MD
 Deepest formation penetrated Marcellus Plug back to (ft) N/A
 Plug back procedure N/A

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Kick off depth (ft) 6300'

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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 _____

Conductor - 0
 Surface - 1 above guide shoe, 1 above insert float, 1 every 4th joint to surface
 Intermediate - 1 above float joint, 1 above float collar, 1 every 4th joint to surface
 Production - 1 above float joint, 1 below float collar, 1 every 3rd joint to top of cement

WAS WELL COMPLETED AS SHOT HOLE Yes No DETAILS _____

WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS _____

WERE TRACERS USED Yes No TYPE OF TRACER(S) USED N/A

API 47- 017 - 06456 Farm name I.L. Morris Well number OXFD 13 AHS

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>	
<u>Marcellus</u>	<u>6813 (TOP)</u> TVD	<u>7227' (TOP)</u> MD
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 2800 psi Bottom Hole --- psi DURATION OF TEST --- hrs

OPEN FLOW Gas 214 mcfpd Oil 1 bpd NGL --- bpd Water 1 bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP		BOTTOM		DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	DEPTH IN FT NAME TVD	DEPTH IN FT TVD	DEPTH IN FT MD	DEPTH IN FT MD	
*PLEASE SEE ATTACHED EXHIBIT 3					

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Please insert additional pages as applicable.

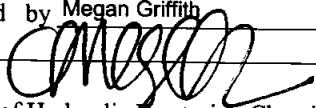
Drilling Contractor Frontier Drilling LLC
Address 562 Spring Run Road City Pennsboro State WV Zip 26415

Logging Company Allied Horizontal Wireline Services
Address 381 Colonial Manor Road City North Huntington State PA Zip 15642

Cementing Company C&J Energy Services
Address 1650 Hackers Creek City Jane Lew State WV Zip 26378

Stimulating Company Baker Hughes
Address 837 Philippi Pike City Clarksburg State WV Zip 26301

Please insert additional pages as applicable.

Completed by Megan Griffith Telephone 303-357-7223
Signature  Title Permitting Agent Date 7/21/20

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

API 47-017-06456 Farm Name I.L. Morris Well Number OXFD 13 AHS

EXHIBIT 1

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	3/11/2020	12511.7	12344.8065	60	Marcellus
2	3/11/2020	12309.02774	12142.1342	60	Marcellus
3	3/12/2020	12106.35548	11939.4619	60	Marcellus
4	3/12/2020	11903.68323	11736.7897	60	Marcellus
5	3/12/2020	11701.01097	11534.1174	60	Marcellus
6	3/12/2020	11498.33871	11331.4452	60	Marcellus
7	3/13/2020	11295.66645	11128.7729	60	Marcellus
8	3/13/2020	11092.99419	10926.1006	60	Marcellus
9	3/13/2020	10890.32194	10723.4284	60	Marcellus
10	3/13/2020	10687.64968	10520.7561	60	Marcellus
11	3/14/2020	10484.97742	10318.0839	60	Marcellus
12	3/14/2020	10282.30516	10115.4116	60	Marcellus
13	3/14/2020	10079.6329	9912.73935	60	Marcellus
14	3/14/2020	9876.960645	9710.0671	60	Marcellus
15	3/15/2020	9674.288387	9507.39484	60	Marcellus
16	3/15/2020	9471.616129	9304.72258	60	Marcellus
17	3/15/2020	9268.943871	9102.05032	60	Marcellus
18	3/16/2020	9066.271613	8899.37806	60	Marcellus
19	3/16/2020	8863.599355	8696.70581	60	Marcellus
20	3/16/2020	8660.927097	8494.03355	60	Marcellus
21	3/16/2020	8458.254839	8291.36129	60	Marcellus
22	3/17/2020	8255.582581	8088.68903	60	Marcellus
23	3/17/2020	8052.910323	7886.01677	60	Marcellus
24	3/17/2020	7850.238065	7683.34452	60	Marcellus
25	3/17/2020	7647.565806	7480.67226	60	Marcellus
26	3/18/2020	7444.893548	7278	60	Marcellus
27	3/18/2020	7242.22129	7075.32774	60	Marcellus

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EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/ other (units)
1	3/11/2020	83.79	8596	6702	4725	402160	7111.905	N/A
2	3/11/2020	83.46	8262	6507	4934	400720	7124.833	N/A
3	3/12/2020	83.58	8397	6200	4890	407360	7024.667	N/A
4	3/12/2020	84.67	8414	5938	4743	402960	6970.714	N/A
5	3/12/2020	83.59	8440	5976	4198	404600	6984.619	N/A
6	3/12/2020	81.68	8349	6441	4596	404300	7032.429	N/A
7	3/13/2020	84.71	8389	7495	4951	404180	6955.952	N/A
8	3/13/2020	84.83	8511	7480	5013	404340	6970.833	N/A
9	3/13/2020	78.77	8512	7580	4622	402780	7342.643	N/A
10	3/13/2020	69.88	8414	7507	4009	402500	6959.071	N/A
11	3/14/2020	84.42	8237	7144	4366	406780	7076.214	N/A
12	3/14/2020	85.99	8428	6663	4239	401980	6945.167	N/A
13	3/14/2020	84.66	8427	7374	4572	402740	6863.952	N/A
14	3/14/2020	84.73	8250	7153	4633	404540	6923.214	N/A
15	3/15/2020	85	8117	7511	4123	402860	6970.357	N/A
16	3/15/2020	85.44	8150	6979	4525	405180	6902.452	N/A
17	3/15/2020	85.77	8230	6880	3928	403880	7046.786	N/A
18	3/16/2020	84.31	8313	6947	4376	403360	6983.214	N/A
19	3/16/2020	84.89	7963	6951	4935	404240	7033.667	N/A
20	3/16/2020	85.88	7732	6629	4788	401080	6732.119	N/A
21	3/16/2020	80.94	7696	6948	4333	408020	8366	N/A
22	3/17/2020	85.9	7863	6468	4146	405940	6854.024	N/A
23	3/17/2020	80.97	7850	6044	4358	402940	8645.119	N/A
24	3/17/2020	84.03	7531	6276	5038	404860	6828.952	N/A
25	3/17/2020	85.98	7511	6027	4705	403600	6593.595	N/A
26	3/18/2020	85.8	7444	5847	4712	406560	6716.833	N/A
27	3/18/2020	85.5	7519	5718	4449	363300	6316.238	N/A
	AVG.	83.7	8,131	6,718	4,552	10,867,760	190,276	TOTAL

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EXHIBIT 3

LITHOLOGY/ FORMATION	TOP DEPTH (TVD)	BOTTOM DEPTH (TVD)	TOP DEPTH (MD)	BOTTOM DEPTH (MD)
	From Surface	From Surface	From Surface	From Surface
Silty Sandstone	120	175	120	175
Sandstone	175	230	175	230
Silty sandstone tr coal	230	595	230	595
Shaly siltstone tr coal	595	610	595	610
Shaly siltstone	610	705	610	705
Silty Sandstone	705	850	705	850
Silty sandstone	850	920	850	920
Silty Sandstone	920	1,190	920	1,190
Siltstone	1,190	1,310	1,190	1,310
Siltstone tr coal	1,310	1,480	1,310	1,480
Sandstone tr coal	1,480	1,800	1,480	1,800
Shaly siltstone tr coal	1,800	1,855	1,800	1,855
Silty sandstone tr coal	1,855	2,012	1,855	2,012
Big Lime	2,012	2,712	1,983	2,712
Fifty Foot Sandstone	2,712	2,802	2,683	2,802
Gordon	2,802	3,142	2,773	3,143
Fifth Sandstone	3,142	3,212	3,114	3,213
Bayard	3,212	3,734	3,184	3,755
Speechley	3,734	3,908	3,726	3,939
Balltown	3,908	4,547	3,910	4,612
Bradford	4,547	4,990	4,583	5,078
Benson	4,990	5,224	5,049	5,325
Alexander	5,224	6,609	5,296	6,849
Sycamore	6,442	6,580	6,648	6,820
Middlesex	6,580	6,727	6,820	7,041
Burkett	6,727	6,767	7,041	7,113
Tully	6,767	6,813	7,113	7,227
Marcellus	6,813	NA	7,227	NA

*Please note Antero determines formation tops based on mud logs that are only run on one well on a multi-well pad. The measured depth (MD) data on subsequent wells may be slightly different due to the well's unique departure.

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	3/11/2020
Job End Date:	3/18/2020
State:	West Virginia
County:	Doddridge
API Number:	47-017-06456-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Oxford 13 AHS
Latitude:	39.16867900
Longitude:	-80.74796800
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,874
Total Base Water Volume (gal):	8,224,718
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
Fresh Water	Halliburton	Base Fluid					
			Water	7732-18-5	100.00000	86.12728	Density = 8.34
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.18719	

HAI-501	Halliburton	Acid Corrosion Inhibitor								
					Listed Below					
OPTIFLO-II DELAYED RELEASE BREAKER	Halliburton	Breaker								
					Listed Below					
HYDROCHLORIC ACID, 22 BAUME	Halliburton	Solvent								
					Listed Below					
MC B-8614	Halliburton	Biocide								
					Listed Below					
Excelerate EC-8	Halliburton	Friction Reducer								
					Listed Below					
Sand-Common White-100 Mesh, SSA-2	Halliburton	Proppant								
					Listed Below					
WG-36 GELLING AGENT	Halliburton	Gelling Agent								
					Listed Below					
SCALECHEK LP-50	Halliburton	Scale Inhibitor								
					Listed Below					

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Items above are Trade Names with the exception of Base Water. Items below are the individual ingredients.

					Crystalline silica, quartz	14808-60-7	100.00000	13.64567	
					Hydrochloric acid	7647-01-0	30.00000	0.04267	
					Guar gum	9000-30-0	100.00000	0.01483	
					Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.01442	
					Acrylamide acrylate polymer	Proprietary	30.00000	0.01442	
					Inorganic salt	Proprietary	30.00000	0.01442	
					Methanol	67-56-1	100.00000	0.00428	
					Phosphoric Acid Salt	Proprietary	30.00000	0.00392	
					Glutaraldehyde	111-30-8	30.00000	0.00262	
					Sodium chloride	7647-14-5	5.00000	0.00065	
					Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl chlorides	68424-85-1	5.00000	0.00044	
					Ammonium persulfate	7727-54-0	100.00000	0.00036	
					Oxylated phenolic resin	Proprietary	30.00000	0.00011	
					Ethanol	64-17-5	1.00000	0.00009	
					Modified thiourea polymer	Proprietary	30.00000	0.00008	
					Mixture of dimer and trimer fatty acids of indefinite composition derived from tall oil	61790-12-3	30.00000	0.00008	
					Ethoxylated alcohols	Proprietary	5.00000	0.00001	
					Propargyl alcohol	107-19-7	5.00000	0.00001	
					Hexadecene	629-73-2	5.00000	0.00001	
					Formaldehyde	50-00-0	0.10000	0.00001	
					Phosphoric acid	7664-38-2	0.10000	0.00001	
					C.I. pigment Orange 5	3468-63-1	1.00000	0.00000	

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* Total Water Volume sources may include various types of water including fresh water, produced water, and recycled water
** Information is based on the maximum potential for concentration and thus the total may be over 100%
*** If you are calculating a percentage of total ingredients do not add the water volume below the green line to the water volume above the green line

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°12'30"

11,188'

2,597' TO BOTTOM HOLE

LATITUDE 39°12'30"

Antero Resources Corporation
Well No. Oxford 13 Unit AHS

AS DRILLED DATA:
WELL AHS TOP HOLE INFORMATION:
N: 246,004ft E: 1,646,175ft
LAT: 39°10'07.24" LON: 80°44'52.69"
BOTTOM HOLE INFORMATION:
N: 251,156ft E: 1,643,023ft
LAT: 39°10'57.72" LON: 80°45'33.61"
WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

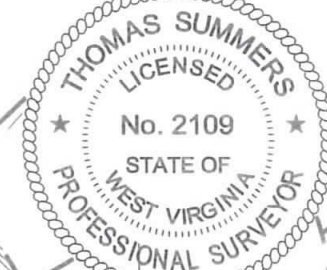
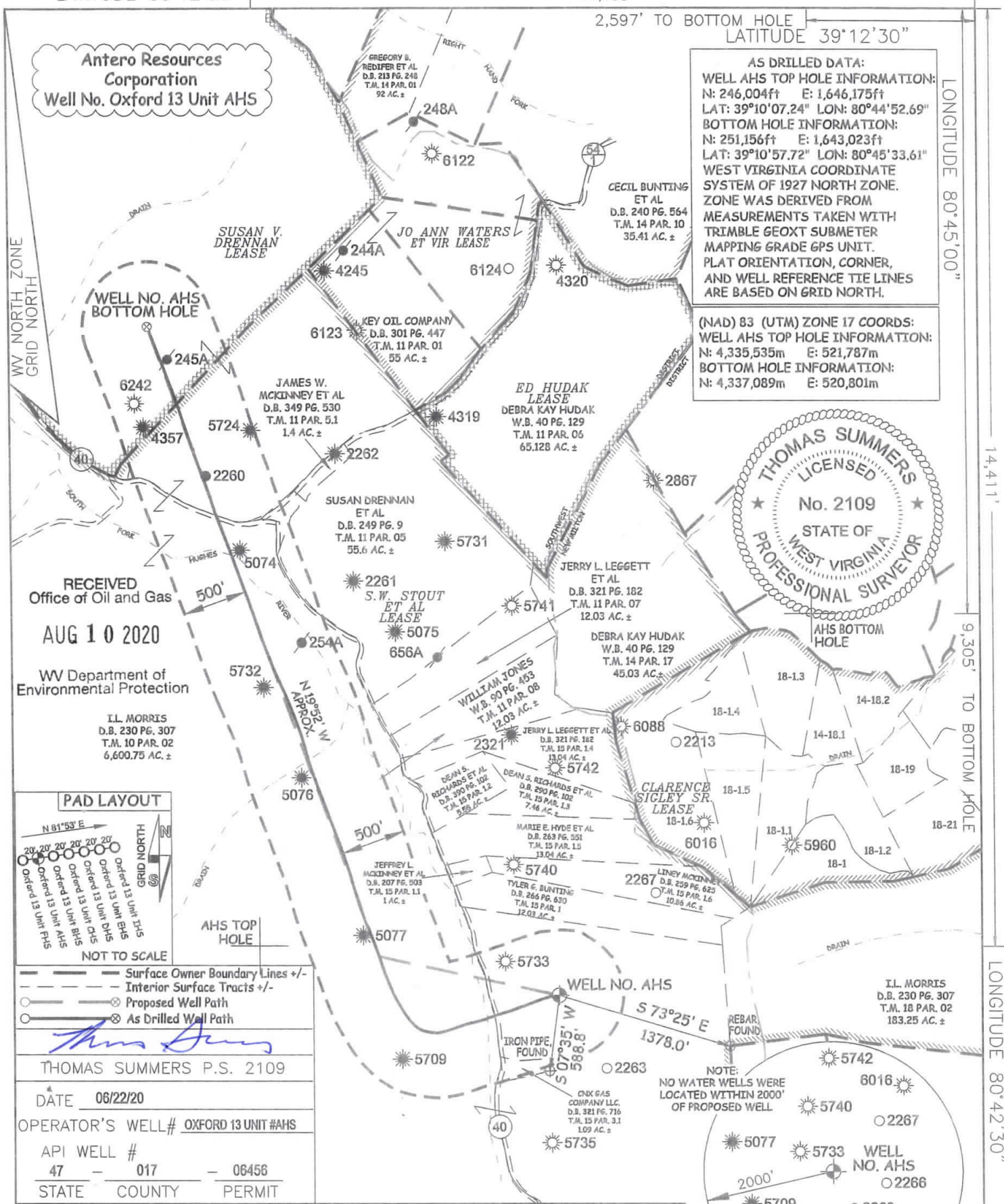
(NAD) 83 (UTM) ZONE 17 COORDS:
WELL AHS TOP HOLE INFORMATION:
N: 4,335,535m E: 521,787m
BOTTOM HOLE INFORMATION:
N: 4,337,089m E: 520,801m

LONGITUDE 80°45'00"

14,411'

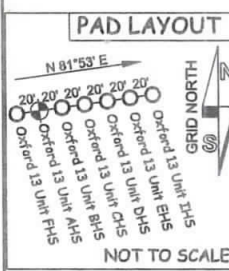
9,305' TO BOTTOM HOLE

LONGITUDE 80°42'30"



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I.L. MORRIS
D.B. 230 PG. 307
T.M. 10 PAR. 02
6,600.75 AC. ±

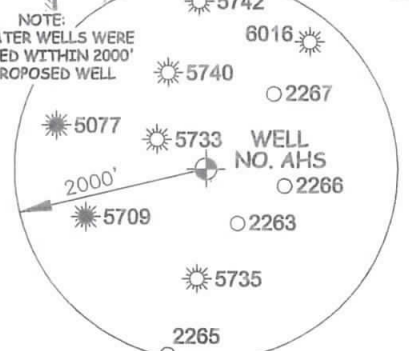


<p>--- Surface Owner Boundary Lines +/-</p> <p>--- Interior Surface Tracts +/-</p> <p>--- Proposed Well Path</p> <p>--- As Drilled Well Path</p>
<p>THOMAS SUMMERS P.S. 2109</p>
<p>DATE 06/22/20</p>
<p>OPERATOR'S WELL# OXFORD 13 UNIT #AHS</p>
<p>API WELL #</p> <p>47 - 017 - 06456</p>
<p>STATE COUNTY PERMIT</p>

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.



STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WILLOW LAND SURVEYING PLLC
220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415



- NOTE
1. NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2,500) SQUARE FEET OR LARGER, USED TO HOUSE OR SHELTER DAIRY CATTLE OR POULTRY HUSBANDRY ARE LOCATED WITHIN SIX HUNDRED TWENTY-FIVE (625) FEET OF THE CENTER OF THE WELL PAD.
 2. TOP HOLE DATA SHOWN HEREON WAS PROVIDED BY ANTERO RESOURCES CORPORATION.
 3. AS DRILLED DATA WAS PROVIDED BY ANTERO RESOURCES CORPORATION.
 4. WLS IS NOT CERTIFYING THE DATA AND INFORMATION PROVIDED LISTED IN NOTES 2 AND 3, ONLY THE RELATIONSHIP TO THE DATA AND INFORMATION PROVIDED TO THE LEASE BOUNDARIES.
 5. WLS IS BY NO MEANS RESPONSIBLE FOR ANY ERRORS OR INACCURACIES WITH THE DATA AND INFORMATION THAT HAS BEEN PROVIDED.

JOB # 20-005WA
DRAWING # OXFORD13AHSAD
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS
WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X
LOCATION: ELEVATION 1,152' AS BUILT WATERSHED HEADWATERS MIDDLE ISLAND CREEK
QUADRANGLE TH - NEW MILTON 7.5' BH - OXFORD 7.5' DISTRICT SOUTHWEST COUNTY DODDRIDGE
SURFACE OWNER I. L. MORRIS ACREAGE 6,600.75 ACRES
OIL & GAS ROYALTY OWNER S. W. STOUT ET AL; SUSAN V. DRENNAN LEASE ACREAGE 1,427 ACRES±; ??? ACRES±

PROPOSED WORK: DRILL ___ CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE ___
PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE IN WELL
(SPECIFY) AS DRILLED PLUG & ABANDON ___ CLEAN OUT & REPLUG ___
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,762' TVD 12,613' MD

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD
DENVER, CO 80202 CHARLESTON, WV 25313

COUNTY NAME PERMIT