



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

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Friday, September 14, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for JACK UNIT 3H
47-095-02463-00-00

Lateral Shift

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: JACK UNIT 3H
Farm Name: ROGER R. WEESE
U.S. WELL NUMBER: 47-095-02463-00-00
Horizontal 6A New Drill
Date Modification Issued:

Promoting a healthy environment.

WW-6B
(04/15)

Permit Modification API# 47-095-02463 **7/16**
API NO. 47-095 - 02463
OPERATOR WELL NO. Jack Unit 3H
Well Pad Name: Neat Pad

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

1) Well Operator: Antero Resources Corporation 494507062 095 - Tyler Meade Middlebourne 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Jack Unit 3H Well Pad Name: Neat Pad

3) Farm Name/Surface Owner: Roger R. Weese Public Road Access: CR 7

4) Elevation, current ground: 1005' Elevation, proposed post-construction: _____

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

Other _____

(b) If Gas Shallow Deep _____

Horizontal _____

6) Existing Pad: Yes or No No

DMH 7-25-18
9CB 7/25/2018

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale: 6600' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2800#

8) Proposed Total Vertical Depth: 6600' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 19500' MD

11) Proposed Horizontal Leg Length: 10817'

12) Approximate Fresh Water Strata Depths: 100', 121', 166'

13) Method to Determine Fresh Water Depths: Offset well records. Depths have been adjusted according to surface elevations.

14) Approximate Saltwater Depths: None Identified

15) Approximate Coal Seam Depths: 1441'

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: _____

Received

7-25-2018

WW-6B
(04/15)

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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	20"	New	H-40	94#	80	80	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	300	300	CTS, 417 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#	19500	19500	4954 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

Draw 7-25-18 JEB 7/25/2018

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"	0.438"	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 & Tilt - 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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JUL 26 2018

WW-6B
(10/14)

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API NO. 47-095 - 02463
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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.

*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.

DH
7-25-18
JCB
7/25/2018

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."

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

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 30.47 acres

22) Area to be disturbed for well pad only, less access road (acres): 8.95 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 2-3% 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 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.

Received

*Note: Attach additional sheets as needed.

JUL 26 2018

Page 3 of 3

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
<u>Roger R. Weese Lease</u>			
Roger R. Weese	Antero Resources Appalachian Corporation	1/8+	0435/0766
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Jennifer Lynn Garland, et al Lease</u>			
Jennifer Lynn Garland	Antero Resources Corporation	1/8+	0517/0147
<u>The Fisher Oil Company Lease</u>			
The Fisher Oil Company	Antero Resources Corporation	1/8+	0516/0627
<u>Roy Hadley, et ux Lease</u>			
Roy Hadley, et ux	Sancho Oil & Gas Company	1/8	0359/0219
Sancho Oil & Gas Company	Antero Resources Appalachian Corporation	Assignment	0436/0177
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Wanda D. Spencer Lease</u>			
Wanda D. Spencer	Antero Resources Corporation	1/8+	0456/0029
<u>Roy D. Hadley, et ux Lease</u>			
Roy D. Hadley, et ux	Antero Resources Corporation	1/8+	0495/0437
<u>Ronald P. Miller Lease</u>			
Ronald P. Miller	Antero Resources Corporation	1/8+	0467/0471
<u>Cathy D. Post Lease</u>			
Cathy D. Post	Antero Resources Corporation	1/8+	0499/0837
<u>Dale V. Hadley Lease</u>			
Dale V. Hadley	Antero Resources Corporation	1/8+	0493/0552

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WV Department of
Environmental Protection

*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.

WW-6A1
(5/13)

Operator's Well No. Jack Unit 3H

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Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>Kimberly Ruble Lease</u>	Kimberly Ruble	Antero Resources Corporation	1/8+	0438/0547

*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.

**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: Antero Resources Corporation
 By: Kevin Kilstrom
 Its: Senior Vice President - Production

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JUL 16 2018

WV Department of
Environmental Protection

FILED

JUN 10 2013

Natalie E. Tennant
Secretary of State
1900 Kanawha Blvd E
Bldg 1, Suite 157-K
Charleston, WV 25305



Penny Barker, Manager
Corporations Division
Tel: (304)558-8000
Fax: (304)558-8381
WebSite: www.wvsof.com
E-mail: business@wvsof.com

APPLICATION FOR
AMENDED CERTIFICATE
OF AUTHORITY

Office Hours: Monday - Friday
8:30 a.m. - 5:00 p.m. ET

FILE ONE ORIGINAL
(Two if you want a filed
stamp) copy returned to you)
FEE: \$25.00

In accordance with the provisions of the West Virginia Code, the undersigned corporation hereby applies for an Amended Certificate of Authority and submits the following statement:

- Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachia Corporation
- Date Certificate of Authority was issued in West Virginia: 6/26/2008
- Corporate name has been changed to: Antero Resources Corporation
(Attach one Certified Copy of Name Change as filed in home State of incorporation.)
- Name the corporation elects to use in WV: Antero Resources Corporation
(due to home state name not being available)
- Other amendments: _____
(attach additional pages if necessary)

6. Name and phone number of contact person. (This is optional; however, if there is a problem with the filing, listing a contact person and phone number may avoid having to return or reject the document.)

Alwyn A. Schopp (303) 357-7310
Contact Name Phone Number

7. Signature information (See below **Important Local Notice Requirements*):

Print Name of Signer: Alwyn A. Schopp Title/Capacity: Authorized Person
Signature: [Handwritten Signature] Date: June 10, 2013

**Important Local Notice Requirements For West Virginia Code §11B-1-12b. Penalty for signing false document. Any person who signs a document he or she knows is false in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jail not more than one year, or both.*

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Environmental Protection



Jack Unit 3H

47095019740000

47095019720000

47095019640000

47095019430000

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JUL 16 2018
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Environmental Protection



Antero Resources Corporation

Jack Unit 3H - AOR



WELL SYMBOLS
Gas Well

July 6, 2018

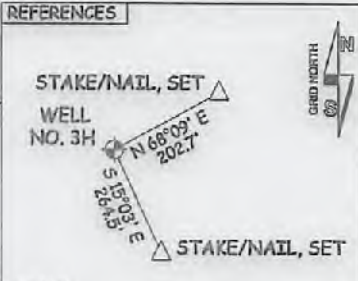
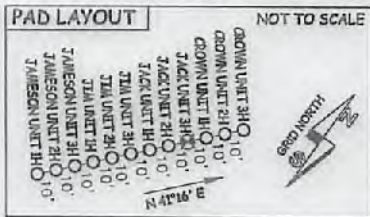
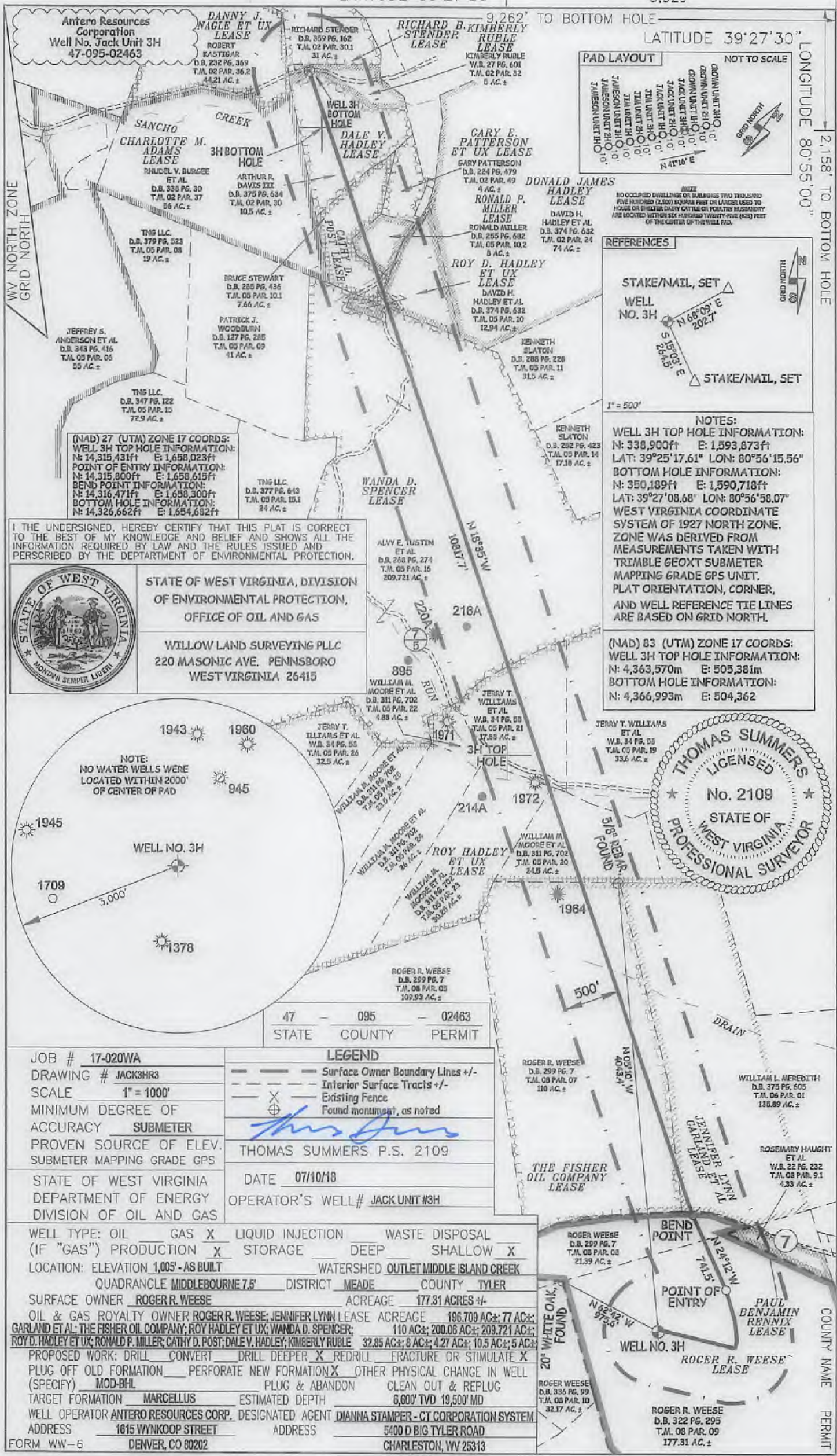
UWI (APINum)	Well Name	Well Number	Operator	Historical Operator	TD
47095019720000	MOORE W M	2	SANCHO OIL & GAS	SANCHO OIL & GAS	5240
47095019430000	HARDMAN O W	1	SANCHO OIL & GAS	SANCHO OIL & GAS	5345
47095019640000	WEESE ROGER R	1	SANCHO OIL & GAS	SANCHO OIL & GAS	5360
47095019740000	WILLIAMS	2	SANCHO OIL & GAS	SANCHO OIL & GAS	5280

JACK UNIT 3H (NEAT PAD) - AREA OF REVIEW 35-8-5.11 PAGE 2

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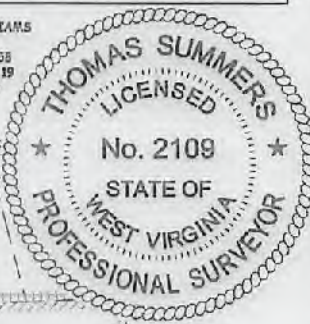
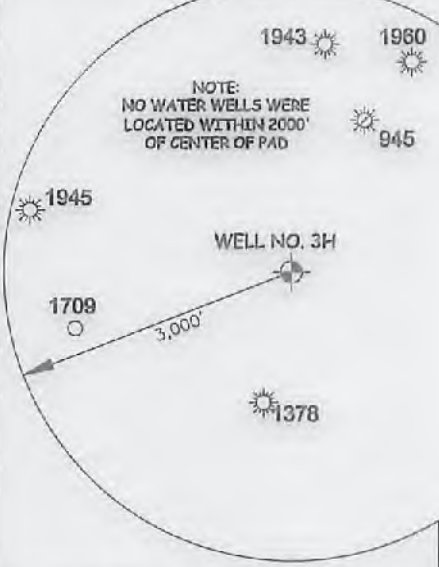
NOTES:
 WELL 3H TOP HOLE INFORMATION:
 N: 338,900ft E: 1,593,873ft
 LAT: 39°25'17.61" LON: 80°56'15.56"
 BOTTOM HOLE INFORMATION:
 N: 350,189ft E: 1,590,718ft
 LAT: 39°27'08.68" LON: 80°56'56.07"
 WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE 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 3H TOP HOLE INFORMATION:
 N: 4,363,570m E: 505,381m
 BOTTOM HOLE INFORMATION:
 N: 4,366,993m E: 504,362

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



47 - 095 - 02463
 STATE COUNTY PERMIT

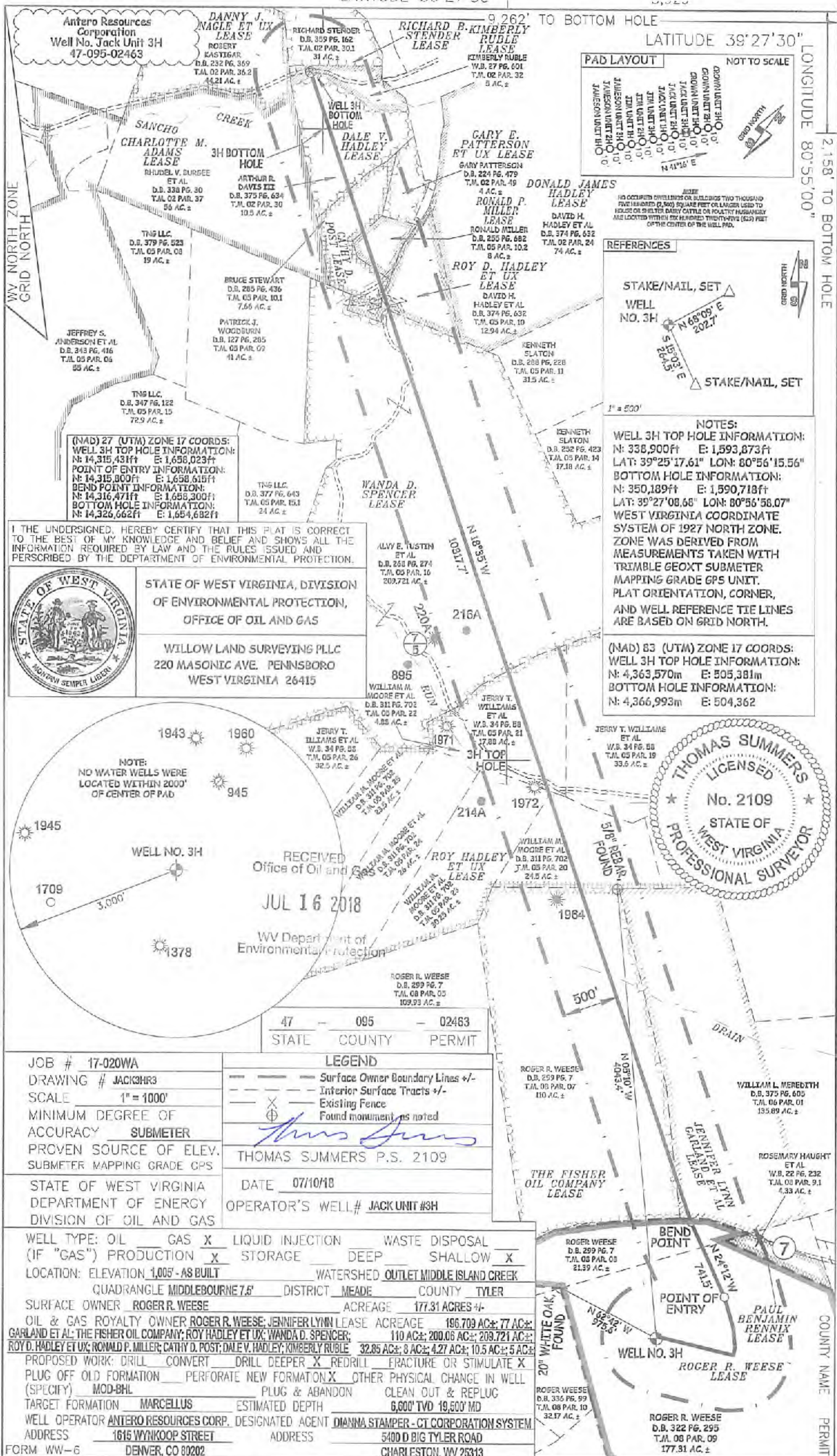
JOB # 17-020WA
 DRAWING # JACK3HR3
 SCALE 1" = 1000'
 MINIMUM DEGREE OF ACCURACY SUBMETER
 PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS
 STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS

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

THOMAS SUMMERS P.S. 2109
 DATE 07/10/18
 OPERATOR'S WELL # JACK UNIT #3H

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
 LOCATION: ELEVATION 1,005' - AS BUILT WATERSHED OUTLET MIDDLE ISLAND CREEK
 QUADRANGLE MIDDLEBOURNE 7.5' DISTRICT MEADE COUNTY TYLER
 SURFACE OWNER ROGER R. WEESE ACREAGE 177.31 ACRES +/-
 OIL & GAS ROYALTY OWNER ROGER R. WEESE; JENNIFER LYNN LEASE ACREAGE 186.709 AC.; 77 AC. +/-
 GARLAND ET AL.; THE FISHER OIL COMPANY; ROY HADLEY ET UX; WANDA D. SPENCER; 110 AC.; 200.06 AC.; 209.721 AC. +/-
 ROY D. HADLEY ET UX; RONALD P. MILLER; CATHY D. POST; DALE V. HADLEY; KIMBERLY RUBLE 32.85 AC.; 8 AC.; 4.27 AC.; 10.5 AC.; 5 AC. +/-
 PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL ERACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) MOD-BHL PLUG & ABANDON CLEAN OUT & REPLUG
 TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,600' TVD 19,500' MD
 WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM
 ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD
 FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

2,158' TO BOTTOM HOLE
 1,3,395'
 LONGITUDE 80°55'00"
 LONGITUDE 80°55'00"



(NAD) 27 (UTM) ZONE 17 COORDS:
 WELL 3H TOP HOLE INFORMATION:
 N: 14,315,431ft E: 1,656,023ft
 POINT OF ENTRY INFORMATION:
 N: 14,315,800ft E: 1,658,615ft
 BEND POINT INFORMATION:
 N: 14,316,471ft E: 1,658,300ft
 BOTTOM HOLE INFORMATION:
 N: 14,326,662ft E: 1,654,682ft

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 WEST VIRGINIA 26415



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47 - 095 - 02463
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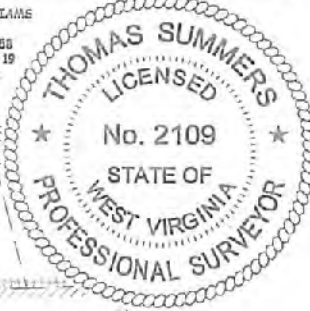
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