



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

August 27, 2014

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET
DENVER, CO 80202

Re: Permit Modification Approval for API Number 1706403 , Well #: LINCOLN UNIT 1H
Moved Horizontal 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,

Gene Smith
Assistant Chief of Permitting
Office of Oil and Gas



Antero Resources
1615 Wynkoop Street
Denver, CO 80202
Office 303.357.7310
Fax 303.357.7315

August 8, 2014

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 modifications for an approved well on the existing Pennington South Pad. We are requesting to move the horizontal lateral which will change the bottom hole location of the Lincoln Unit 1H (API #47-017-06403).

Attached you will find the following documents:

- REVISED Form WW-6B, which shows the revised MD and Production Casing/Cement program
- REVISED Mylar Plat, which shows the new bottom hole location
- NOTE: This well does not drill into any additional leases; therefore, a revised Form WW-6A1 has not been included.

If you have any questions, please feel free to contact me at (303)357-6820.

Thank you in advance for your consideration.

Sincerely,



Natalie Komp
Permitting Representative
Antero Resources Corporation

Enclosures

Received

AUG 12 2014

Office of Oil and Gas
WV Dept. of Environmental Protection

08/29/2014

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

1) Well Operator: Antero Resources Corporation 494488557 Doddridge New Milton New Milton 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Lincoln Unit 1H Well Pad Name: Pennington South Pad

3) Farm Name/Surface Owner: Davis, Brian E. Public Road Access: CR 13

4) Elevation, current ground: 1060' Elevation, proposed post-construction: 1060'

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

(b) If Gas Shallow Deep
Horizontal

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus Shale: 7100' TVD, Anticipated Thickness- 60 feet, Associated Pressure- 3250#

8) Proposed Total Vertical Depth: 7100' TVD

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 18,300' MD

11) Proposed Horizontal Leg Length: 10,647'

12) Approximate Fresh Water Strata Depths: 63', 168', 375'

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

14) Approximate Saltwater Depths: 1316', 1378', 1401', 1453'

15) Approximate Coal Seam Depths: None Identified

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

AUG 12 2014

WW-6B
(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#	440'	440' *see #19	CTS, 611 Cu. Ft
Coal	9-5/8"	New	J-55	36#	2470'	2470'	CTS, 1006 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	17900'	17900'	4524 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

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	Received	
Depths Set:	N/A	AUG 12 2014	

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 freshwater 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/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."

Received

AUG 12 2014

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21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 10.87 Acres

22) Area to be disturbed for well pad only, less access road (acres): 4.28 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:

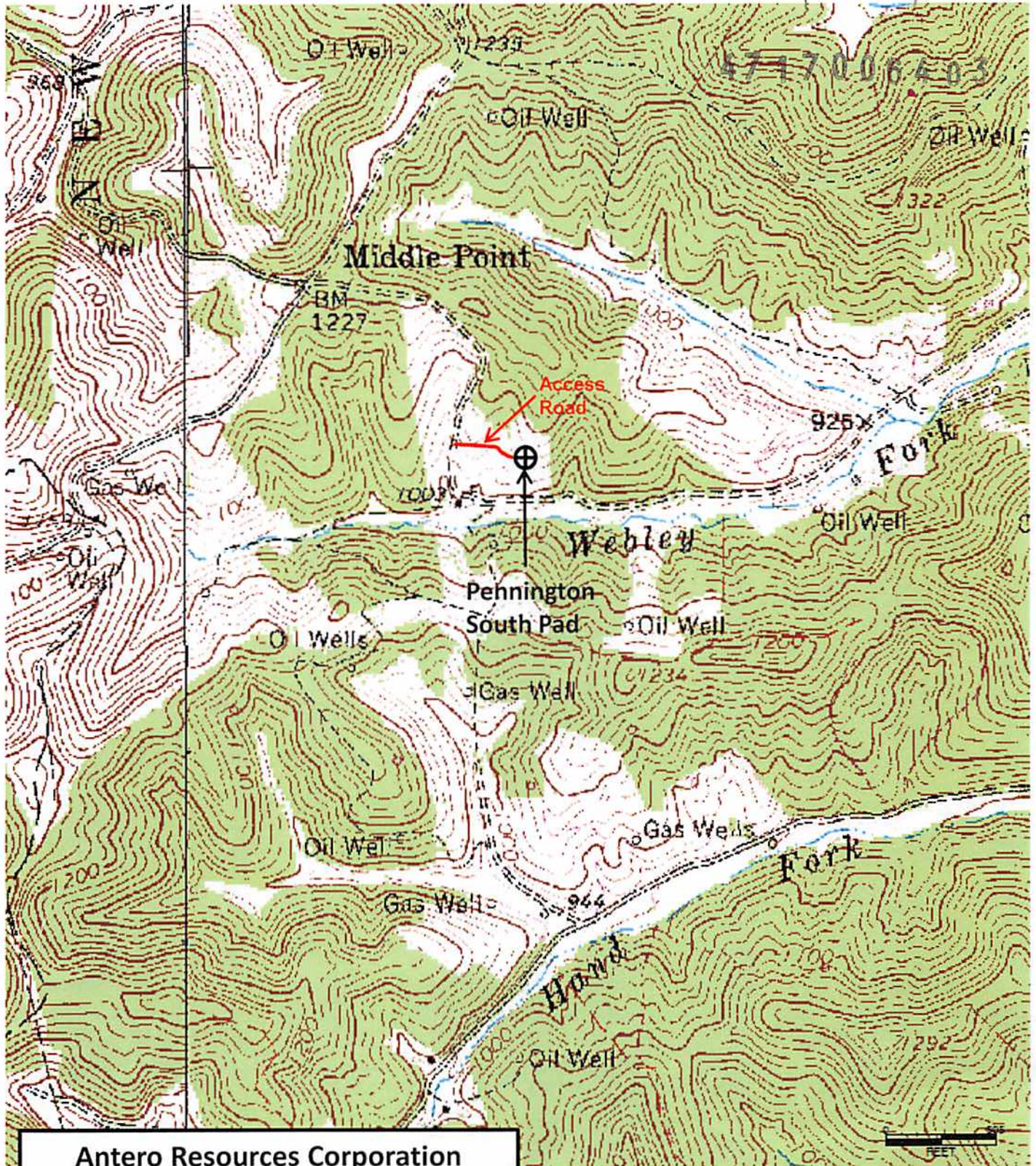
Conductor: no additives, Class A cement.
Surface: Class A cement with 2% calcium and 1/4 lb flake, 5 gallons of clay treat
Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat
Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 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.

*Note: Attach additional sheets as needed.

plat spotted



Antero Resources Corporation
 Appalachian Basin
 Lincoln Unit 1H
 Doddridge County

Quadrangle: New Milton
 Watershed: Webley Fork
 District: New Milton
 Date: 7-26-2013

RECEIVED
 Office of Oil and Gas
 OCT 25 2013
 WV Department of
 Environmental Protection
 08/29/2014

LATITUDE 39°12'30"

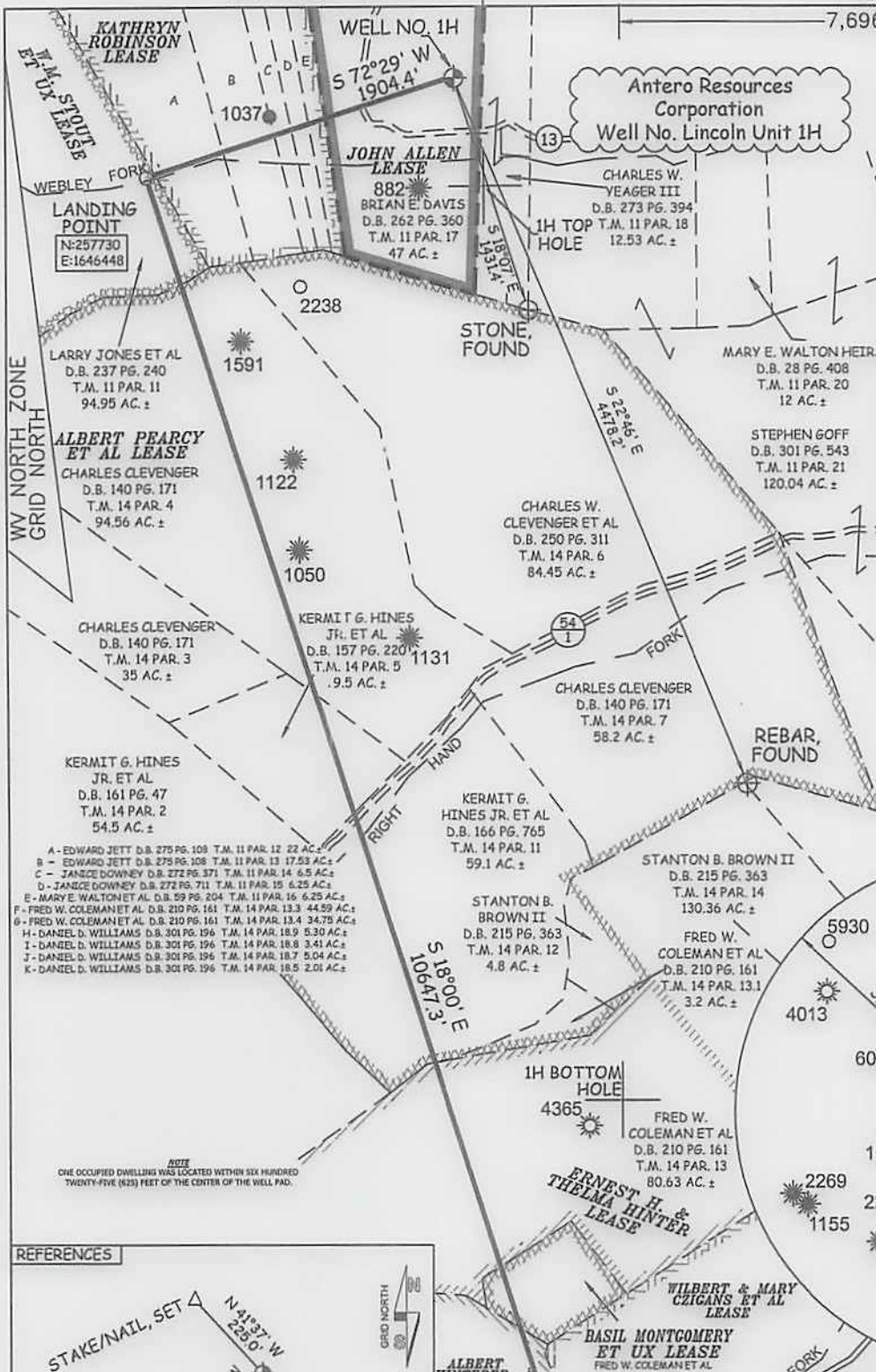
9,313'

7,696' TO BOTTOM HOLE

LATITUDE 39°12'30"

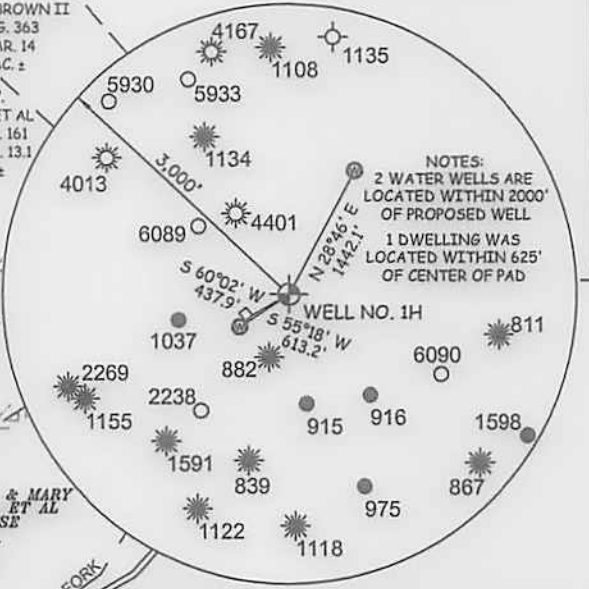
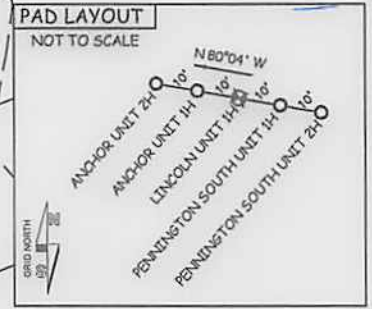
LONGITUDE 80°42'30"

LONGITUDE 80°42'30"



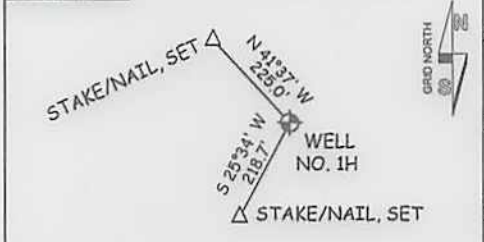
NOTES:
WELL 1H TOP HOLE INFORMATION:
 N: 258,303ft E: 1,648,265ft
BOTTOM HOLE INFORMATION:
 N: 247,603ft E: 1,649,739ft
 LAT: 39°10'23.54" LON: 80°44'07.72"
 WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

(NAD) 83 (UTM) ZONE 17 COORDS:
WELL 1H TOP HOLE INFORMATION:
 N: 4,339,293m E: 522,361m
BOTTOM HOLE INFORMATION:
 N: 4,336,041m E: 522,865m

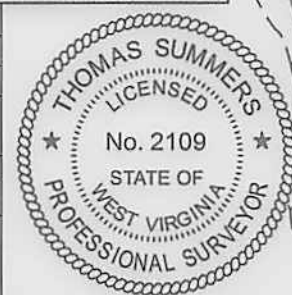


- A - EDWARD JETT D.B. 275 PG. 109 T.M. 11 PAR. 12 22 AC.±
- B - EDWARD JETT D.B. 275 PG. 109 T.M. 11 PAR. 13 17.53 AC.±
- C - JANICE DOWNEY D.B. 272 PG. 371 T.M. 11 PAR. 14 6.5 AC.±
- D - JANICE DOWNEY D.B. 272 PG. 711 T.M. 11 PAR. 15 6.25 AC.±
- E - MARY E. WALTON HEIRS D.B. 59 PG. 204 T.M. 11 PAR. 16 6.25 AC.±
- F - FRED W. COLEMAN ET AL D.B. 210 PG. 161 T.M. 14 PAR. 13 44.59 AC.±
- G - FRED W. COLEMAN ET AL D.B. 210 PG. 161 T.M. 14 PAR. 13.4 34.75 AC.±
- H - DANIEL D. WILLIAMS D.B. 301 PG. 196 T.M. 14 PAR. 18.9 3.41 AC.±
- I - DANIEL D. WILLIAMS D.B. 301 PG. 196 T.M. 14 PAR. 18.8 3.41 AC.±
- J - DANIEL D. WILLIAMS D.B. 301 PG. 196 T.M. 14 PAR. 18.7 5.04 AC.±
- K - DANIEL D. WILLIAMS D.B. 301 PG. 196 T.M. 14 PAR. 18.5 2.01 AC.±

REFERENCES



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

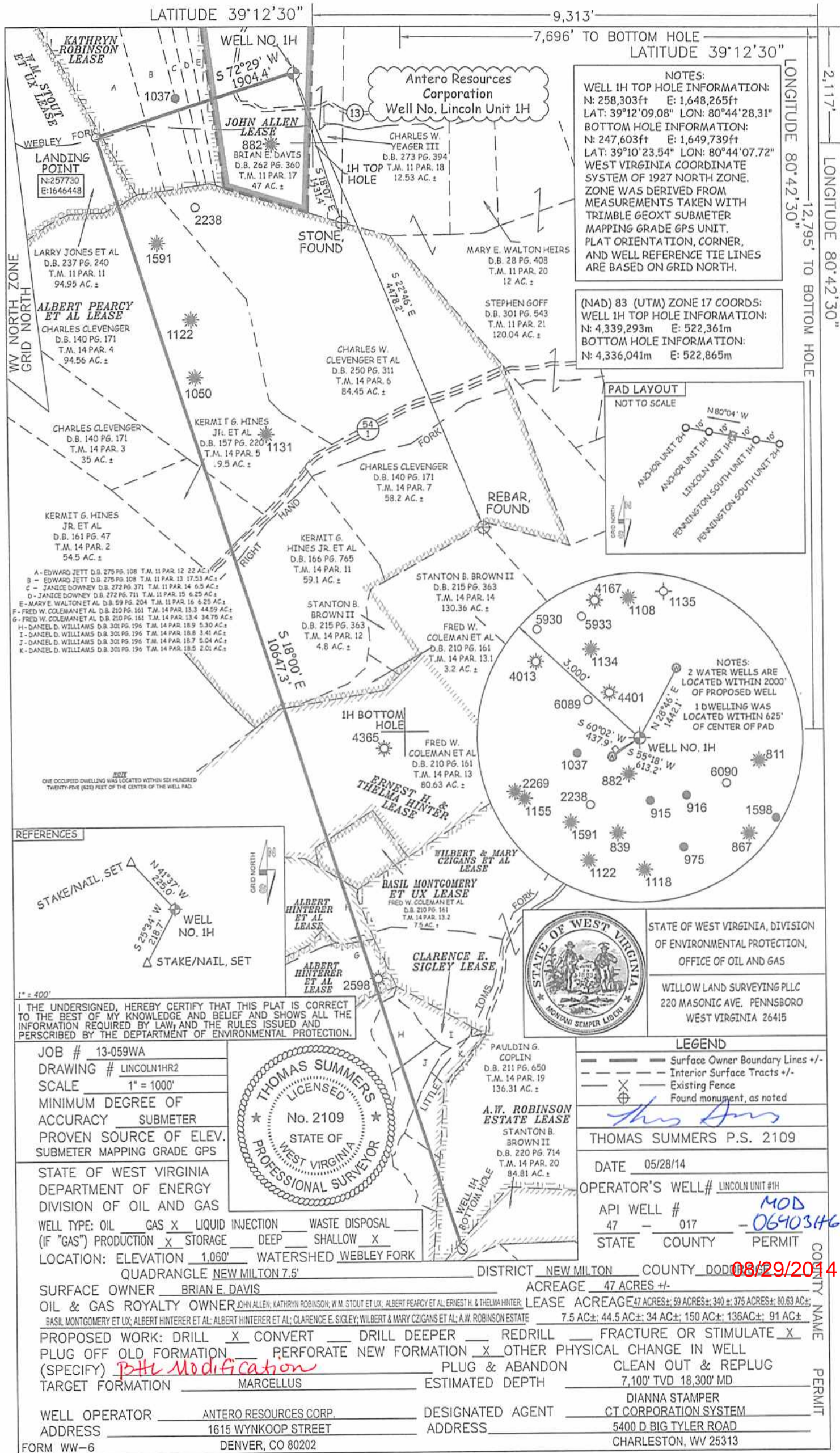
JOB # 13-059WA
 DRAWING # LINCOLN1HR2
 SCALE 1" = 1000'
 MINIMUM DEGREE OF ACCURACY SUBMETER
 PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS
 STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS
 WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL
 (IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X
 LOCATION: ELEVATION 1,060' WATERSHED WEBLEY FORK

QUADRANGLE NEW MILTON 7.5' DISTRICT NEW MILTON COUNTY DODD
 SURFACE OWNER BRIAN E. DAVIS ACREAGE 47 ACRES +/-
 OIL & GAS ROYALTY OWNER JOHN ALLEN; KATHRYN ROBINSON; W.M. STOUT ET UX; ALBERT PEARCY ET AL; ERNEST H. & THELMA HINTER; LEASE ACREAGE 47 ACRES±; 59 ACRES±; 340 ±; 375 ACRES±; 80.63 AC±; BASIL MONTGOMERY ET UX; ALBERT HINTERER ET AL; CLARENCE E. SIGLEY; WILBERT & MARY CZIGANS ET AL; A.W. ROBINSON ESTATE 7.5 AC±; 44.5 AC±; 34 AC±; 150 AC±; 136AC±; 91 AC±
 PROPOSED WORK: DRILL X CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE X
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL
 (SPECIFY) RHL Modification PLUG & ABANDON CLEAN OUT & REPLUG
 TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,100' TVD 18,300' MD
 WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
 ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD
 FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

LEGEND
 --- Surface Owner Boundary Lines +/-
 --- Interior Surface Tracts +/-
 X Existing Fence
 ⊕ Found monument, as noted
 THOMAS SUMMERS P.S. 2109
 DATE 05/28/14
 OPERATOR'S WELL# LINCOLN UNIT #H
 API WELL # MOD
 47 - 017 - 06403H6A
 STATE COUNTY PERMIT

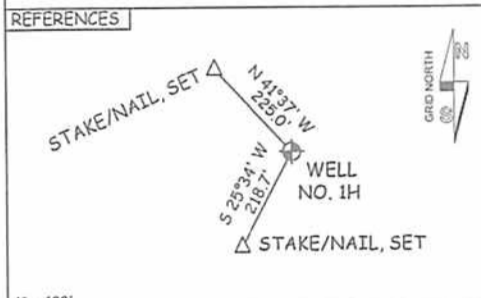
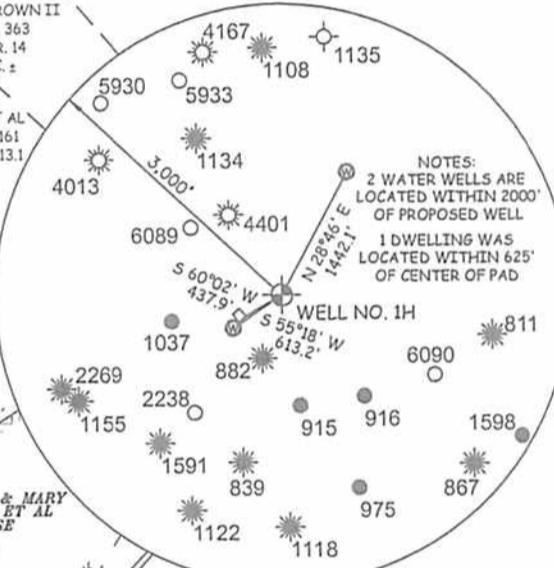
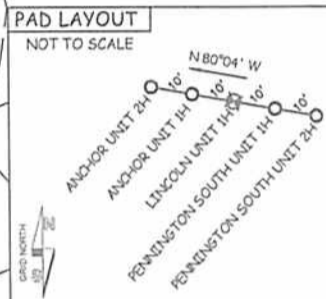
08/29/2014

COUNTY NAME PERMIT

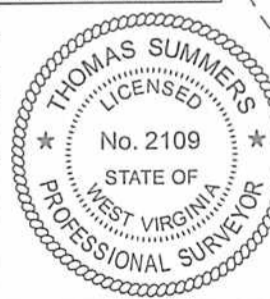


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STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

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

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 - - - Interior Surface Tracts +/-
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