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

January 19, 2016

EQT PRODUCTION COMPANY
120 PROFESSIONAL PLACE
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 8510218, Well #: 515888

Lateral path, SSP, Casing

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,

Laura L. Adkins

Gene Smith
for Assistant Chief of Permitting
Office of Oil and Gas

WW - 6B
(4/15)

4708510218

API NO. 47 - 085 - 10218 MOD
OPERATOR WELL NO. 515888
Well Pad Name: PUL96

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

1) Well Operator:	EQT Production Company	306686	085	4	562
		Operator ID	County	District	Quadrangle

2) Operator's Well Number: 515888 Well Pad Name PUL96

3) Farm Name/Surface Owner : James H & Wilma J Wilson Public Road Access: CR 7/4

4) Elevation, current ground: 1,194.0 Elevation, proposed post-construction: 1,182.0

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

Other _____

(b) If Gas: Shallow ▪ Deep _____

Horizontal ▪

Michael Duff
12-2-15

6) Existing Pad? Yes or No: no

7) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):

Target formation is Marcellus at a depth of 6417 with the anticipated thickness to be 50 feet and anticipated target pressure of 2190 PSI

Top of Marcellus: 6397

8) Proposed Total Vertical Depth: 6417
9) Formation at Total Vertical Depth: Marcellus
10) Proposed Total Measured Depth: 12608
11) Proposed Horizontal Leg Length: 5449
12) Approximate Fresh Water Strata Depths: 342,368,399,556, ,
13) Method to Determine Fresh Water Depth: By offset wells
14) Approximate Saltwater Depths: None found in offset well reports
15) Approximate Coal Seam Depths: None found
16) Approximate Depth to Possible Void (coal mine, karst, other): None reported
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: _____

WW - 6B
(4/15)

API NO. 47 - 085 - 10218 MOD
OPERATOR WELL NO. 515888
Well Pad Name: PUL96

47085102 18

CASING AND TUBING PROGRAM

18)

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: for Drilling	INTERVALS: Left in Well	CEMENT: Fill- up (Cu.Ft.)
Conductor	20	New	A-500	78.6	40	40	60 C.T.S.
Fresh Water	13 3/8	New	J-55	54.5	656	656	623 C.T.S.
Coal	–	–	–	–	–	–	
Intermediate	9 5/8	New	A-500	40	2,567	2,567	1,011 C.T.S.
Production	5 1/2	New	P-110	20	12,608	12,608	See Note 1
Tubing	2 3/8		J-55	4.6			May not be run, if run will be set 100' less than TD
Liners							

MAC 12-2-15

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	26	0.375	-	18	Construction	1.18
Fresh Water	13 3/8	17 1/2	0.38	2,730	2,184	* See Note 2	1.19
Coal							
Intermediate	9 5/8	12 3/8	0.395	3,950	3,160	* See Note 2	1.19
Production	5 1/2	8 1/2	0.361	12,640	10,112	-	1.07/1.86
Tubing							
Liners							

Packers

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

Note 1: EQT plans to bring the TOC on the production casing cement job 500' above the top producing zone.

Note 2: Reference Variance 2014-17. (Attached)

WW - 6B
(10/14)

4708510218

API NO. 47 - 085 - 10218 MOD
OPERATOR WELL NO. 515888
Well Pad Name: PUL96

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

Drill and complete a new horizontal well in the Marcellus formation.

Drill the vertical to an approximate depth of 4565'.

Kick off and drill curve. Drill lateral in the Marcellus. Cement casing.

MDC 12-2-15

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Hydraulic fracturing is completed in accordance with state regulations using water recycled from previously fractured wells and obtained from freshwater sources. This water is mixed with sand and a small percentage (less than 0.3%) of chemicals (including 15% Hydrochloric acid, gelling agent, gel breaker, friction reducer, biocide, and scale inhibitor), referred to in the industry as a "slickwater" completion. Maximum anticipated treating pressures are expected to average approximately 8500 psi, maximum anticipated treating rates are expected to average approximately 100 bpm. Stage lengths vary from 150 to 300 feet. Average approximately 200,000 barrels of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 200,000 pounds of sand per stage.

21) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): ± 28.99

22) Area to be disturbed for well pad only, less access road (acres): ± 6.48

23) Describe centralizer placement for each casing string.

- Surface: Bow spring centralizers – One at the shoe and one spaced every 500'.
- Intermediate: Bow spring centralizers– One cent at the shoe and one spaced every 500'.
- Production: One spaced every joint from production casing shoe to KOP

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

Surface (Type 1 Cement): 0-3% Calcium Chloride Used to speed the setting of cement slurries. 0.25% flake. Loss Circulation Material (LCM) is used to combat the loss of the cement slurry to a thief zone.

Intermediate (Type 1 Cement): 0-3% Calcium Chloride. Salt is used in shallow, low temperature formations to speed the setting of cement slurries. 0.25% flake. Loss Circulation Material (LCM) is used to combat the loss of whole drilling fluid or cement slurry (not filtrate) to a thief zone.

Production:

Lead (Type H Cement): 0.2% CD-20 (dispersant makes cement easier to mix). .15% SuperFL-300 (fluid loss/lengthens thickening time) .15% SEC-10 (fluid loss) 50:50 POZ (extender)

Tail (Type H Cement): 0.2% Super CR-1 (Retarder). Lengthens thickening time. .3% Super FL-200 (fluid loss) .2% SEC-10 (Fluid loss). .2% SuperFL-350 (fluid loss) Reduces amount of water lost to formation. 60 % Calcuim Carbonate. Acid solubility.

25) Proposed borehole conditioning procedures.

Surface: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. A constant rate of higher than expected cuttings volume likely indicates washouts that will not clean up.

Intermediate: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. If foam drilling, to enhance hole cleaning use a soap sweep or increase injection rate & foam concentration.

Production: Pump marker sweep with nut plug to determine actual hole washout. Calculate a gauge holes bottoms up volume. Perform a cleanup cycle by pumping 3-5 bottoms up or until the shakers are clean. Check volume of cuttings coming across the shakers every 15 minutes.

*Note: Attach additional sheets as needed.

RECEIVED
Office of Oil and Gas
DEC 04 2015
WV Department of
Environmental Protection

4708518218 WD

MAG 12-2-15

Well 515888(PUL96H6) Pad Name

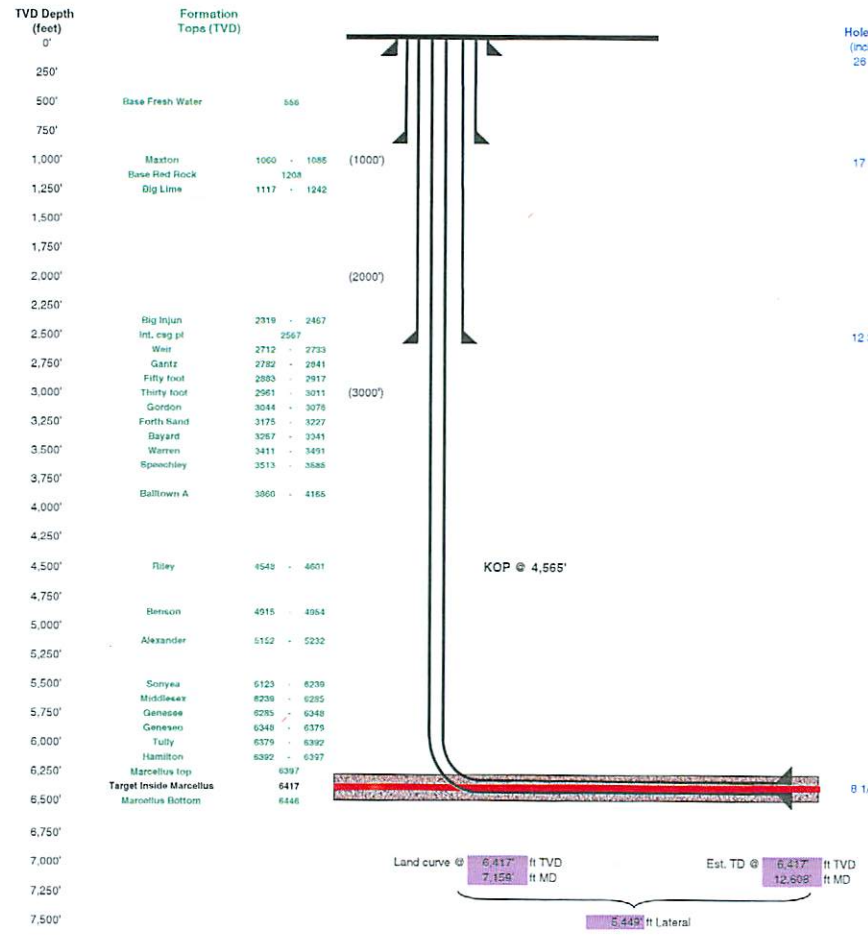
EQT Production

Pullman

Ritchie West Virginia

Azimuth 164.75

Vertical Section 5482



Hole Size (inches)	Type	Size (inches)	Wt (ppf)	Grade	Casing Wall Thickness	Depth (feet)	Top of Cement	Method
26	Conductor	20	78.6	A-500	0.312	40	Surface	Displacement
17 1/2	Surface	13 3/8	54.5	J-55	0.38	656	Surface	Displacement
12 3/8	Intermediate	9 5/8	40	A-500	0.395	2567	Surface	Displacement
8 1/2	Production Casing	5 1/2	20	P-110	0.361	12608	500' above top Producing Zone	Displacement

Proposed Well Work:
Drill and complete a new horizontal well in the Marcellus formation.
Drill the vertical to an approximate depth of 4565'.
Kick off and drill curve. Drill lateral in the Marcellus. Cement casing.

4708510218 Mon

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Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
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March 18, 2014

Nabors Completion & Production Services Company
1380 Route 286 Hwy E #121
Indiana PA 15701

Re: Cement Variance Request

Dear Sir or Madam,

This agency is approving a variance request for the cement blend listed below to be used on surface and coal protection strings for the drilling of oil and gas wells in the state of West Virginia. The variance cannot be used without requesting its use on a permit application and approval by this agency:

- Type 1 (2% Calcium Chloride-Accelerator, 0.25% Super Flake-Lost Circulation, 5.2% Water, 94% Type "1" Cement)

If you have any questions regarding this matter feel free to contact me at 304-926-0499, ext. 1653.

Sincerely,

James Peterson by GCS

James Peterson
Environmental Resources Specialist / Permitting

Promoting a healthy environment.

4708510218 Mod

west virginia department of environmental protection

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Charleston, WV 25304
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Earl Ray Tomblin, Governor
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BEFORE THE OFFICE OF OIL AND GAS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OF WEST VIRGINIA

IN THE MATTER OF A VARIANCE FROM	)	**ORDER NO. 2014 - 17**
REGULATION 35 CSR § 4-11.4/11.5/14.1	)	
AND 35 CSR § 8-9.2.h. 4/5/6/8 OF THE	)	
THE OPERATIONAL	)	
REGULATIONS OF CEMENTING OIL	)	
AND GAS WELLS	)	

REPORT OF THE OFFICE

Nabors Completion & Production Services Co. requests approval of a different cement blend for use in cementing surface and coal protection casing of oil and gas wells.

FINDINGS OF FACT

1.) Nabors Completion & Production Services Co. proposes the following cement blend:

- 2% Calcium Chloride (Accelerator)
- 0.25 % Super Flake (Lost Circulation)
- 94% Type "1" Cement
- 5.20 % Water

2.) Laboratory testing results indicate that the blend listed in Fact No.1 will achieve a 500 psi compressive strength within 6 hours and a 2,435 psi compressive strength within 24 hours.

4708510218 MOD

CONCLUSIONS OF LAW

Pursuant to Articles 6 and 6A, Chapter 22 of the Code of West Virginia, the Office of Oil and Gas has jurisdiction over the subject matter embraced in said notice, and the persons interested therein, and jurisdiction to promulgate the hereinafter prescribed Order.

Pursuant to 35 CSR § 4-11.5 and 35 CSR § 8-9.2.h.8 the Chief of the Office of Oil and Gas may approve different cement blends upon the well operator providing satisfactory proof that different cement types are adequate.

ORDER

It is ordered that Nabors Completion & Production Services Co. may use the cement blend listed in Findings of Fact No.1 for the cementing of surface and coal protection casing of oil and gas wells in the State as may be requested by oil and gas operators. The waiting time on the cement blend shall be **8** hours. The cement blend shall be mixed in strict accordance with the specifications for each blend and weight measurements made on-site to assure the cement slurries meet the minimum weight specifications. A sample shall be collected and, if after **8** hours the cement is not set up, additional time will be required. Nabors Completion & Production Services Co. shall keep a record of cement blend jobs in which the cement blend approved under this order is to be used and made available to the Office of Oil and Gas upon request.

Dated this, the 18th day of March, 2014.

IN THE NAME OF THE STATE OF WEST VIRGINIA

OFFICE OF OIL AND GAS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OF THE STATE OF WEST VIRGINIA

James Martin, Chief
Office of Oil and Gas

4708510218 MWD

Where energy meets innovation.

Site Specific Safety Plan

EQT PUL96 Pad

Pullman
Ritchie County, WV

515888 For Wells:

Date Prepared: November 24, 2015

EQT Production

Title: Permitting Supervisor

Date: 11-25-15

WV Oil and Gas Inspector

Title

Date: 12-2-15

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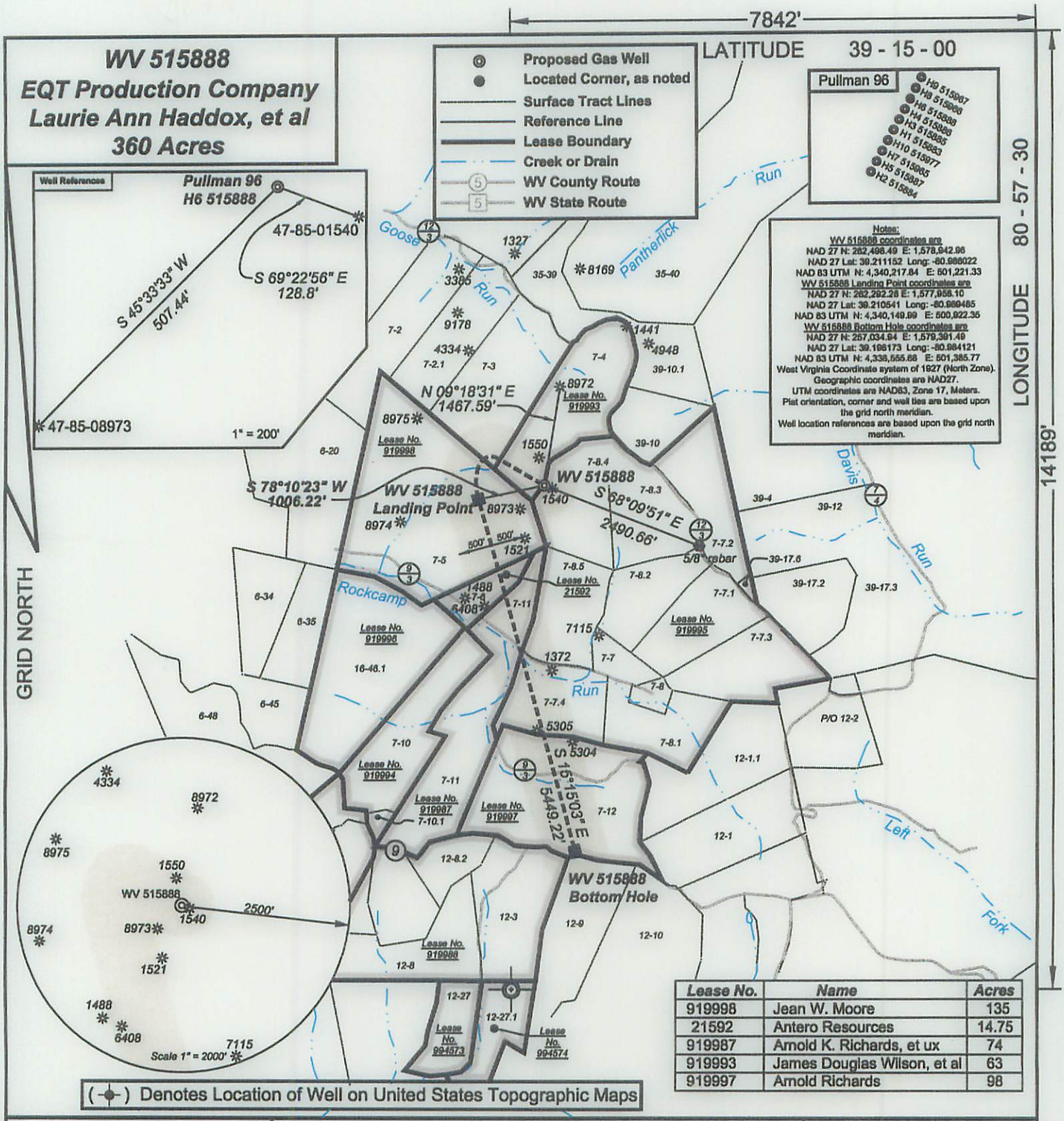
Office of Oil and Gas

DEC 04 2015

WV Department of
Environmental Protection

WV 515888
EQT Production Company
Laurie Ann Haddox, et al
360 Acres



(⊕) Denotes Location of Well on United States Topographic Maps

Lease No.	Name	Acres
919998	Jean W. Moore	135
21592	Antero Resources	14.75
919987	Arnold K. Richards, et ux	74
919993	James Douglas Wilson, et al	63
919997	Arnold Richards	98

ALLEGHENY SURVEYS, INC.

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 regulations issued and prescribed by the Department of Environmental Protection.

Dwayne A. Hall
P.S. 2089SU

DWAYNE A. HALL LICENSED No. 2089 SU STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR SEAL

FILE NO: 243-14
DRAWING NO: 243-14 Pullman 96 H6.dwg
SCALE: 1" = 2000'
MINIMUM DEGREE OF ACCURACY: 1:2500
PROVEN SOURCE OF ELEVATION: NGS CORS Station

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

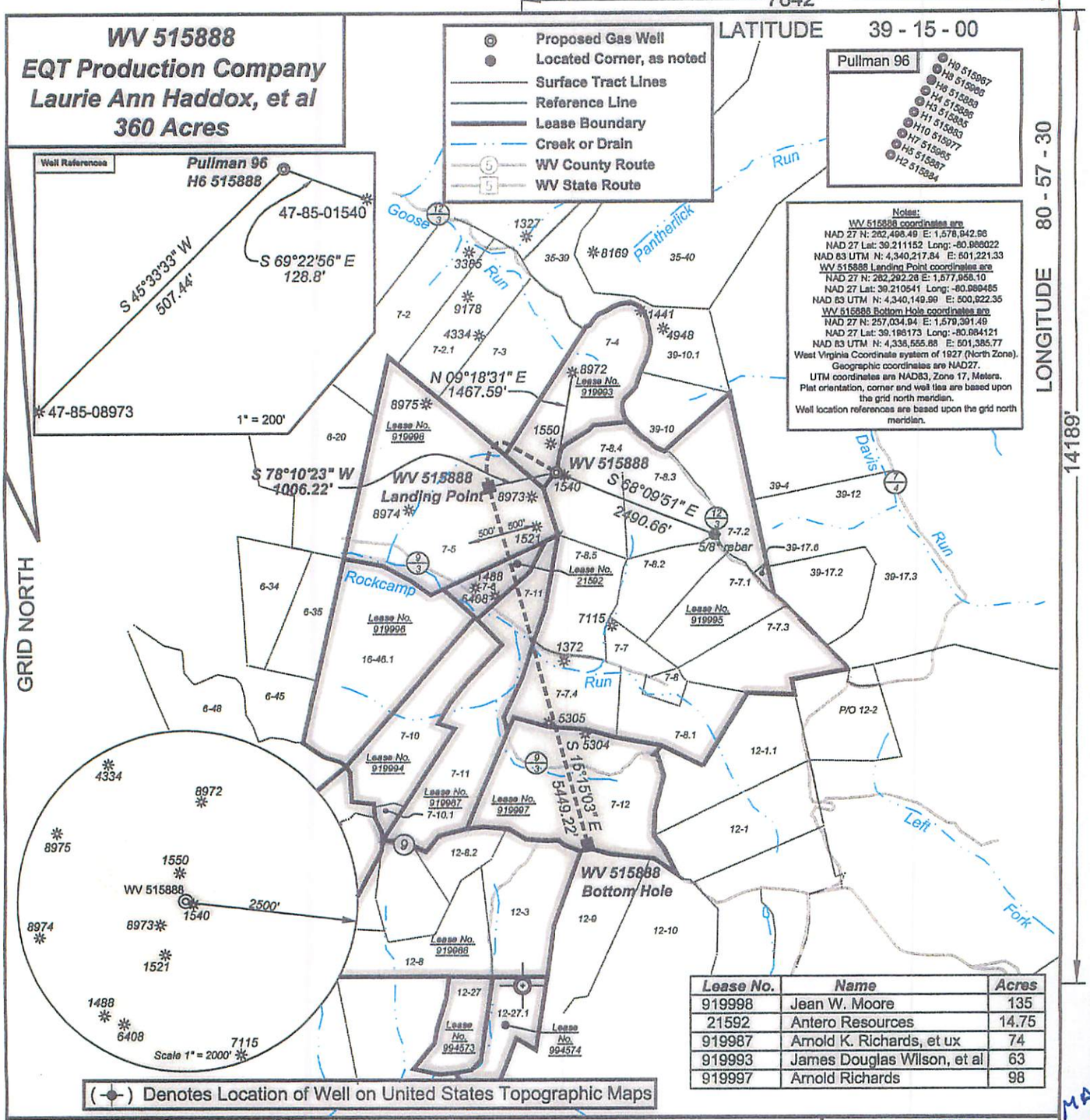
DATE: November 24 20 15
OPERATOR'S WELL NO. 515888
API WELL NO H6A
47 - 85 - 10218 MOD
STATE COUNTY PERMIT

WELL TYPE: ☐ OIL ☒ GAS ☐ LIQUID INJECTION ☐ WASTE DISPOSAL
(IF GAS) PRODUCTION : ☐ STORAGE ☐ DEEP ☒ SHALLOW
LOCATION: ELEVATION: Original: 1194' Proposed: 1182' WATERSHED Goose Run of Rockcamp Run QUADRANGLE: Pullman
DISTRICT: Union COUNTY: Ritchie
SURFACE OWNER: James H. & Wilma J. Wilson ACREAGE: 40.089
ROYALTY OWNER: Laurie Ann Haddox, et al LEASE NO: 919995 ACREAGE: 360
PROPOSED WORK: ☒ DRILL ☐ CONVERT ☐ DRILL DEEPER ☒ FRACTURE OR STIMULATE ☐ PLUG OFF OLD FORMATION
☐ PERFORATE NEW FORMATION ☐ OTHER PHYSICAL CHANGE IN WELL (SPECIFY)
☐ PLUG AND ABANDON ☐ CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus ESTIMATED DEPTH: TVD 6,396

WELL OPERATOR: EQT Production Company
ADDRESS: PO Box 280 / 115 Professional Place
Bridgeport, WV 26330

DESIGNATED AGENT: Rex C. Ray
ADDRESS: PO Box 280 / 115 Professional Place
Bridgeport, WV 26330

WV 515888
EQT Production Company
Laurie Ann Haddox, et al
360 Acres



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(⊕) Denotes Location of Well on United States Topographic Maps

MAC 10-2-15

ALLEGHENY SURVEYS, INC.

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 regulations issued and prescribed by the Department of Environmental Protection.

Duane A. Hall
P.S. 2089SU

RECEIVED
Office of Oil and Gas
DEC 04 2015
WV Department of Environmental Protection

WAYNE A. HALL — STATE OF WEST VIRGINIA — PROFESSIONAL SURVEYOR — SEAL

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SCALE: 1" = 2000'
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PROVEN SOURCE OF ELEVATION: NGS CORS Station

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

RECEIVED
Office of Oil and Gas
DEC 04 2015
WV Department of Environmental Protection

OPERATORS WELL NO. 515888
API WELL NO.
47 - 85 - 10218 UOD H6A
STATE COUNTY PERMIT

WELL TYPE: ☐ OIL ☒ GAS ☐ LIQUID INJECTION ☐ WASTE DISPOSAL
(IF GAS) PRODUCTION : ☐ STORAGE ☐ DEEP ☒ SHALLOW
LOCATION: ELEVATION: Original: 1194' Proposed: 1182' WATERSHED Goose Run of Rockcamp Run QUADRANGLE: Pullman
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WELL OPERATOR: EQT Production Company
ADDRESS: PO Box 280 / 115 Professional Place, Bridgeport, WV 26330
DESIGNATED AGENT: Rex C. Ray
ADDRESS: PO Box 280 / 115 Professional Place, Bridgeport, WV 26330