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west virginia department of environmental protection

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Office of Oil and Gas  
601 57<sup>th</sup> Street, S.E.  
Charleston, WV 25304  
(304) 926-0450  
fax: (304) 926-0452

Jim Justice, Governor  
Austin Caperton, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

PERMIT MODIFICATION APPROVAL  
Horizontal 6A / Horizontal 6A Well - 1

EQT PRODUCTION COMPANY  
120 PROFESSIONAL PLACE  
BUILDING II  
BRIDGEPORT, WV 26330


Re: Permit Modification Approval for 515886  
47-085-10217-00-00

Lateral Length of Well Reduced

EQT PRODUCTION COMPANY

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: 515886  
Farm Name: WILSON, JAMES H. & WILMA J.  
U.S. WELL NUMBER: 47-085-10217-00-00  
Horizontal 6A / Horizontal 6A Well - 1  
Date Issued: 1/20/2017

Promoting a healthy environment.

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01/27/2017



PZ: 8/04

May 19, 2016

Mr. Gene Smith  
West Virginia Department of Environmental Protection  
Office of Oil and Gas  
601 57th Street SE  
Charleston, WV 25304

Re: Modification of 47-085-10217

Dear Mr. Smith,

Enclosed is an updated WW-6B, schematics, WW-6A1, mylar plat and rec plan. The lateral bore was drilled shorter than what was permitted. EQT would like to submit this correction for your files.

If you have any questions, please do not hesitate to contact me at (304) 848-0076.

Sincerely,

Vicki Roark  
Permitting Supervisor-WV

Enc.

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

1) Well Operator: EQT Production Company 306686 Ritchie Union PULLMAN  
Operator ID County District Quadrangle

2) Operator's Well Number: 515886 Well Pad Name: PUL96

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

4) Elevation, current ground: 1182.6 Elevation, proposed post-construction: 1182.6

5) Well Type (a) Gas  Oil  Underground Storage

Other \_\_\_\_\_

(b) If Gas Shallow  Deep \_\_\_\_\_

Horizontal

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus, 6370', 54', 2190 PSI

8) Proposed Total Vertical Depth: 6370

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 14630

11) Proposed Horizontal Leg Length: 4930

12) Approximate Fresh Water Strata Depths: 352,378,409,566

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13) Method to Determine Fresh Water Depths: By offsetting wells

14) Approximate Saltwater Depths: n/a

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15) Approximate Coal Seam Depths: n/a

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**Environmental Protection**

16) Approximate Depth to Possible Void (coal mine, karst, other): n/a

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: \_\_\_\_\_

15)

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	A-500	75.8	40	40	44.64 ft <sup>3</sup> / CTS
Fresh Water	13 3/8	New	J-55	54.5	670	670	718.8 ft <sup>3</sup> / CTS
Coal							
Intermediate	9 5/8	New	A-500	40	2570	2570	1165.84 ft <sup>3</sup> / CTS
Production	5 1/2	New	P-110	20	14830	14830	500' above top producing zone
Tubing	2 3/8		J-55	4.7		May not be run, if run set 40' above top perfor or 40' inclination	
Liners							

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./ft)
Conductor	20	24	.375	1378	18	Class A	1.18
Fresh Water	13 3/8	17 1/2	.38	2700	2160	See Reference #1001	1.20
Coal							
Intermediate	9 5/8	12 3/8	.395	3950	3160	See Reference #1001	1.18
Production	5 1/2	8 1/2	.361	12640	10112	Class H	1.25/2.06
Tubing	2 3/8	NA	.19	7700			
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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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 4579'. Kick off and drill curve. Drill the lateral in the Marcellus. Cement casing.

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 internal casing pressure is expected to be approximately 10000 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): NO ADDITIONAL

22) Area to be disturbed for well pad only, less access road (acres): NO ADDITIONAL

23) Describe centralizer placement for each casing string:

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

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

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Conductor: Class A no additives  
 Surface (Class A Cement): 0-3% Calcium Chloride. Used to speed the setting of cement slurries  
 Intermediate (Class A Cement): 0-3% Calcium Chloride. Used to speed the setting of cement slurries.  
 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 % Calcium Carbonate. Acid solubility.

25) Proposed borehole conditioning procedures:

Surface: Circulate hole clean while rotating & reciprocating the drill string until cuttings diminish at surface.  
 Intermediate: Circulate hole clean while rotating & reciprocating the drill string until cuttings diminish at surface.  
 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.

085-1021

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Admuth 165  
Vertical Section 7535

Well 515886(PUL96H4)  
EOT Production  
Pulman Quad  
Ritchie County, WV

Note: Diagram is not to scale

Formations	Top TVD	Base TVD
Conductor	40	
Base Fresh Water	566	
Surface Casing	670	
Base Red Rock		1218
Maxton	1840	1880
Big Lime	2060	2149
Big Injun	2149	2214
Well	2457	2502
Intermediate Casing	2570	
Gantz	2672	2695
Fifty foot	2754	2788
Thirty foot	2803	2824
Gordon	2841	2901
Forth Sand	2961	2969
Bayard	3112	3143
Warren	3513	3559
Speechley	3623	3750
Baltown A	3961	4012
Riley	4608	4629
Benson	4949	4989
Alexander	5228	5253
Soyes	6109	6223
Middlesex	6223	6275
Genesee	6275	6323
Genesee	6323	6350
Tully	6350	6350
Hamilton	6359	6362
Marcellus	6362	6416
Production Casing	14630	MD
Onondaga	6416	MD

Casing and Cementing		Deepest Fresh Water: 566'		
Type	Conductor	Surface	Intermediate	Production
Hole Size, In.	26	17 1/2	12 9/8	8 1/2
Casing Size, OD In.	20	13 3/8	9 5/8	5 1/2
Casing Wall Thickness, In.	0.375	0.380	0.395	0.361
Depth, MD	40'	670'	2,570'	14,630'
Weight	78.6#	54.5#	40#	20#
Grade	A-500	J-55	A-500	P-110
New or Used	New	New	New	New
Burst (psi)	1378	2,700	3,950	12,640
Cement Class	A	A / Type 1	A / Type 1	H
Cement Yield	1.18	1.19	1.19	1.07/1.86
Top of Cement (Planned) TVD	Surface	Surface	Surface	500' above top Producing Zone
Method	Displacement	Displacement	Displacement	Displacement
Est. Volume (cu ft)	60	602	1,012	2,928
Possible Additives	N/A	Calcium Chloride	Calcium Chloride	Calcium Carbonate, Fluid Loss, Extender, Dispersant, Viscosifier, Defoamer, POZ, Bonding Agent, Retarder, Anti-Settling/Suspension Agent



Proposed Well Work:  
Drill and complete a new horizontal well in the Marcellus formation.  
Drill the vertical to an approximate depth of 4579'.  
Kick off and drill curve. Drill lateral in the Marcellus. Cement casing.

01/27/2017

085-10217

**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:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
see attachment				

**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: EQT Production Company  
 By: Victoria J Roark  
 Its: Permitting Supervisor



085-10217

WW-6A1 attachment

Operator's Well No.

515886

Lease No.	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>919995</u>	<u>Laurie Ann Haddox, et al (royalty owner)</u> James A. Wilson, et ux (original lessor) R. W. Richards J. E. Richards and C. W. Richards Bolyard Oil & Gas, LTD Sheffield Exploration Co. M. S. Oil Co. (69.513%) Applied Mechanics, et al FS Limited Partnership	R. W. Richards J. E. Richards and C. W. Richards Bolyard Oil & Gas, LTD Sheffield Exploration Co. M. S. Oil Co. (69.513% of working interest) and Applied Mechanics Corp. (30.487% of working interest) Applied Mechanics, et al FS Limited Partnership EQT Production Co.	***	LB79/542 LB80/78 LB169/136 LB189/521 LB208/268 LB222/836 AB274/80 AB274/102
<u>919993</u>	<u>James Douglas Wilson, et al (royalty owner)</u> Effie E. Wilson and James Wilson (original lessor) J.E. Richards J.E. Richards and C.W. Richards P.O. Burgy, B.S. Marshall, L.B. Burgy & Rollo Riggs J. E. Richards and C.W. Richards Applied Mechanics, et al FS Limited Partnership	J.E. Richards J. E. Richards and C.W. Richards P.O. Burgy, B.S. Marshall, L.B. Burgy & Rollo Riggs J. E. Richards and C.W. Richards Applied Mechanics, et al FS Limited Partnership EQT Production Co.	***	LB79/346 LB79/407 LB81/279 LB123/303 LB206/8 AB274/80 AB274/102
<u>919998</u>	<u>Jean Moore (current royalty owner)</u> Robert D. Elder, et ux (original lessor) N.M. Welch Ohio-West Virginia Oil & Gas Co. N.M. Welch J. E. Richards and C.W. Richards Applied Mechanics, et al FS Limited Partnership	N.M. Welch Ohio-West Virginia Oil & Gas Co. N.M. Welch J. E. Richards and C.W. Richards Applied Mechanics, et al FS Limited Partnership EQT Production Co.	***	LB81/521 LB81/546 LB82/425 LB82/500 LB206/8 AB274/80 AB274/102
<u>919996</u>	<u>Darren M. Dodd, et al (current royalty owner)</u> Ruby Dotson, et al (original lessor) J. E. Richards J. E. Richards and C. W. Richards Applied Mechanics, et al FS Limited Partnership	J. E. Richards J. E. Richards and C. W. Richards Applied Mechanics, et al FS Limited Partnership EQT Production Co.	***	LB80/449 LB80/455 LB206/8 AB274/80 AB274/102
<u>919994</u>	<u>S&amp;R Gas Ventures, et al (royalty owner)</u> Ethel M. Turner, widow (original lessor) J. E. Richards J. E. Richards and C. W. Richards Applied Mechanics, et al FS Limited Partnership	J. E. Richards J. E. Richards and C. W. Richards Applied Mechanics, et al FS Limited Partnership EQT Production Co.	***	LB80/451 LB80/455 LB206/8 AB274/80 AB274/102
<u>919987</u>	<u>Arnold K. Richards (royalty owner)</u> A. H. Hodge and Ona Hodge (original lessor) J. E. Richards J. E. Richards and C. W. Richards Bolyard Oil & Gas, LTD Sheffield Exploration Co. M. S. Oil Co. (69.513%) Applied Mechanics, et al FS Limited Partnership	J. E. Richards J. E. Richards and C. W. Richards Bolyard Oil & Gas, LTD Sheffield Exploration Co. M. S. Oil Co. (69.513% of working interest) and Applied Mechanics Corp. (30.487% of working interest) Applied Mechanics, et al FS Limited Partnership EQT Production Co.	***	LB80/449 LB80/455 LB169/310 LB189/521 LB208/268 LB222/836 AB274/80 AB274/102
<u>919988</u>	<u>William K. Wilson, Trust et al (royalty owner)</u> Arden Wilson, et ux (original lessor) J. E. Richards J. E. Richards and C.W. Richards Applied Mochanics, et al FS Limited Partnership	J. E. Richards J. E. Richards and C. W. Richards Applied Mechanics, et al FS Limited Partnership EQT Production Co.	***	LB81/515 LB80/455 LB206/8 AB274/80 AB274/102

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\*\*\* We will pay one-eighth of the total amount paid to or received by or allowed to the owner of the working interest at the wellhead for the oil or gas so extracted, produced, or marketed before deducting the amount to be paid to or set aside for the owner of the oil or gas in place, on all such oil or gas to be extracted, produced, or marketed from the well.

01/27/2017





085-10217

May 19, 2016

Mr. James Martin  
West Virginia Department of Environmental Protection  
Office of Oil and Gas  
601 57th Street SE  
Charleston, WV 25304

Re: PUL96 (515886) 47-085-10217  
Union District, Ritchie County

Dear Mr. Martin,

EQT Production Company is submitting an application for a new well work permit for the above well number. Upon information and belief, Operator's lease and/ or other real property rights permit it to conduct drilling operations for the subject well in the location shown on the plat, including under any public roads that the well lateral crosses.

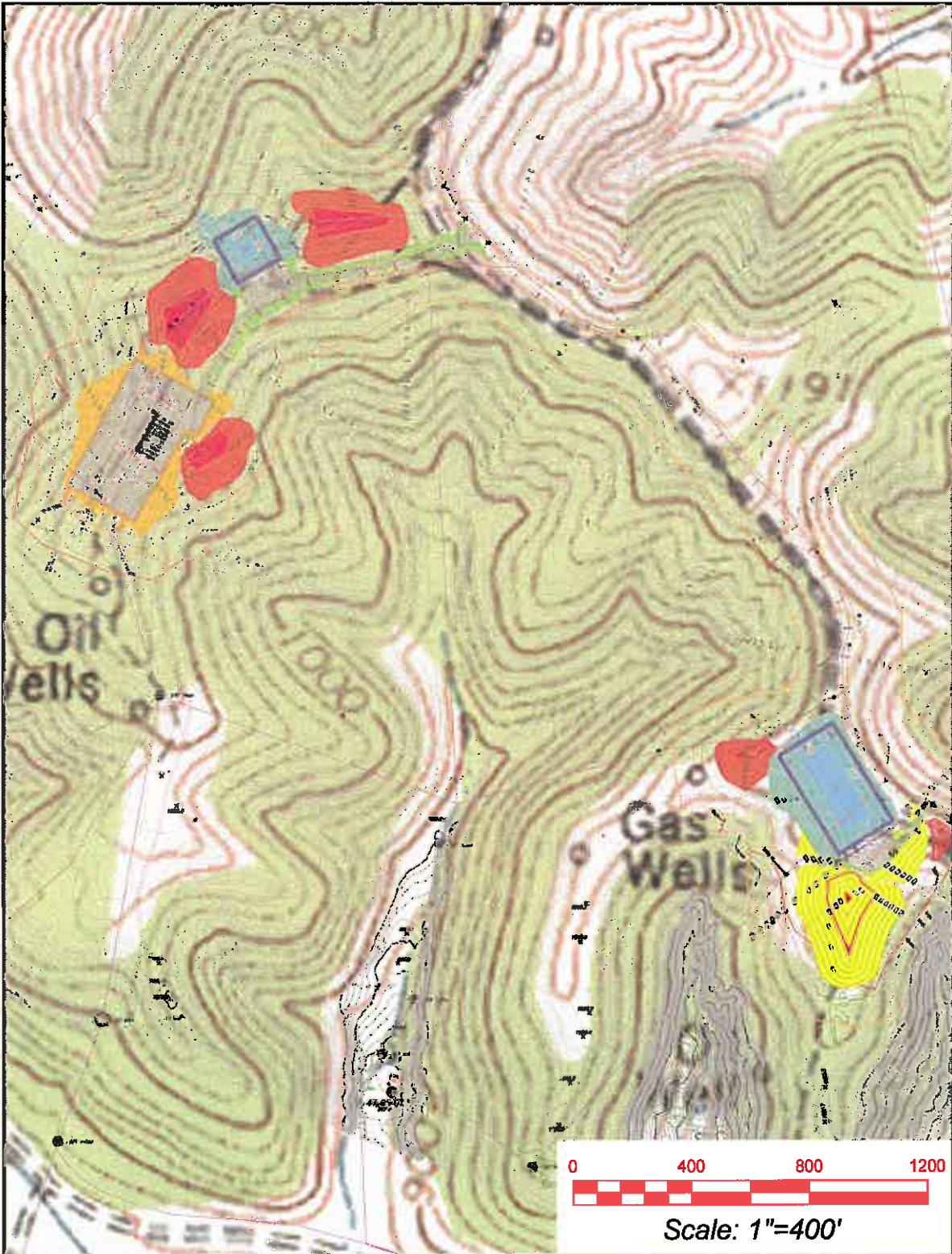
Sincerely,

Vicki Roark  
Permitting Supervisor-WV

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MAY 20 2016  
WV Department of  
Environmental Protection

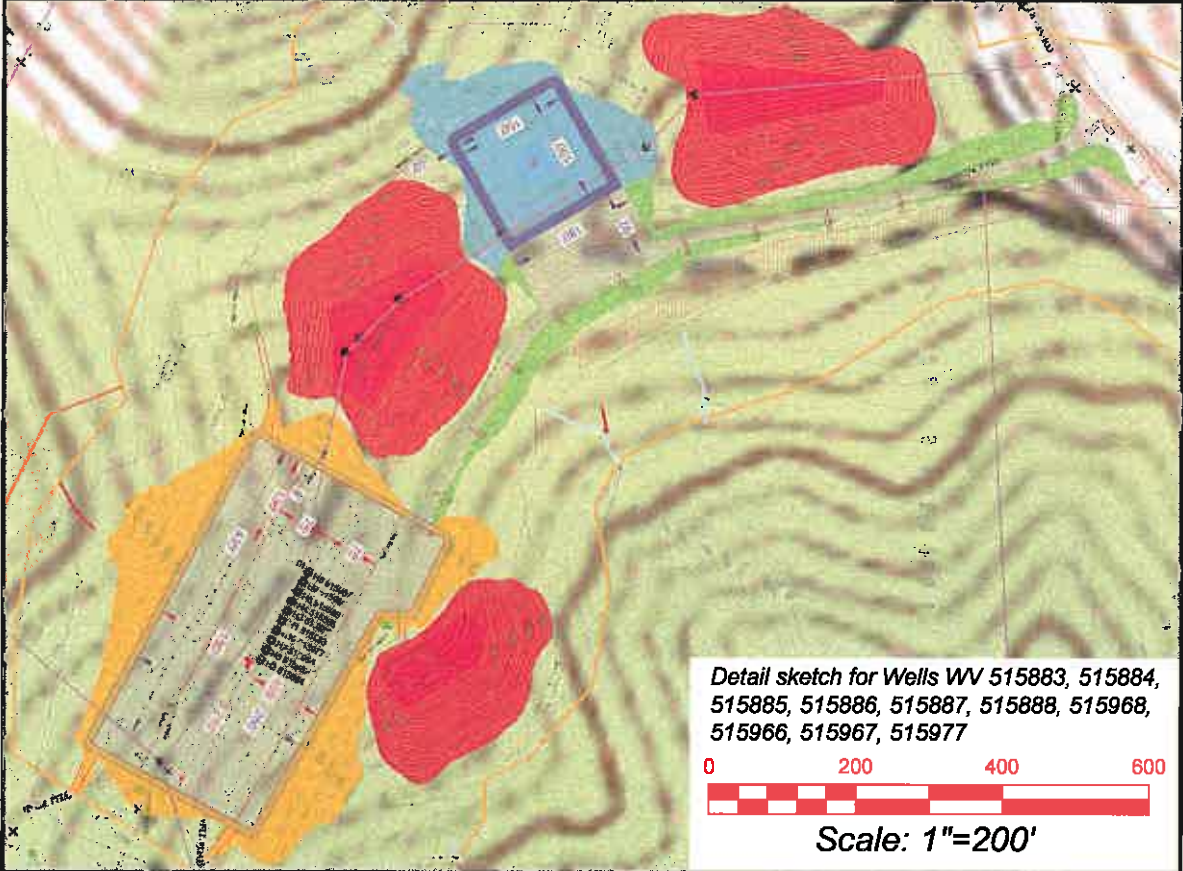
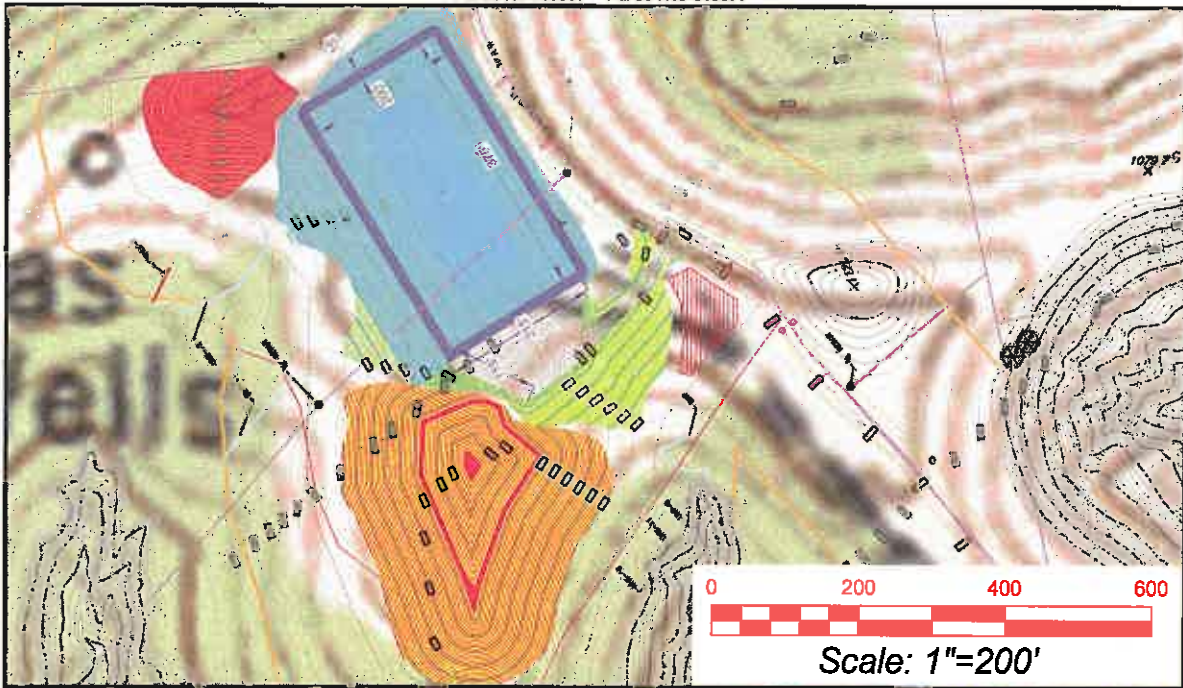
EQT Production 115 Professional Place | P.O. Box 280 | Bridgeport, WV 26330  
T 304.848.0000 | F 304.848.0040 | [www.eqt.com](http://www.eqt.com)

01/27/2017



Pullman 7.5' USGS QUADRANGLE		Proposed Disturbance Area		Note: SEE SITE PLAN OF PULLMAN 96 FOR COMPLETE GRADING & DRAINAGE CONSTRUCTION INCLUDING EROSION & SEDIMENT CONTROL DETAILS, ETC. <b>RECEIVED</b> <b>Office of Oil and Gas</b>  <b>MAY 20 2016</b>  <b>WV Department of Environmental Protection</b>
Projected culvert inventory. (for bid purposes only)		Well Site Location	See Site Plan	
15" minimum diameter culverts	See Site Plan	Proposed Access Road	See Site Plan	
24" minimum diameter culverts	See Site Plan	Approximate Total Disturbance	See Site Plan	
DRAWN BY: Dwayne A. Hall, PS	DATE: April 11, 2016	FILE NO. 243-14	DRAWING FILE NO. 243-14 Rec Plan	
<p><b>SURVEYING AND MAPPING SERVICES PERFORMED BY:</b>  <b>ALLEGHENY SURVEYS, INC.</b>          Birch River Office 1-800-482-8606 237 Birch River Road          Phone: (304) 649-8606 P.O. Box 438          Fax: (304) 649-8608 Birch River, WV 26610</p>				





Detail sketch for Wells WV 515883, 515884, 515885, 515886, 515887, 515888, 515968, 515966, 515967, 515977

Pullman 7.5' USGS QUADRANGLE		Proposed Disturbance Area		Note: SEE SITE PLAN OF PULLMAN 96 FOR COMPLETE GRADING & DRAINAGE CONSTRUCTION INCLUDING EROSION & SEDIMENT CONTROL DETAILS, ETC.  <b>RECEIVED</b> Office of Oil and Gas  MAY 20 2016  WV Department of Environmental Protection
Projected culvert inventory. (for bid purposes only)		Well Site Location	See Site Plan	
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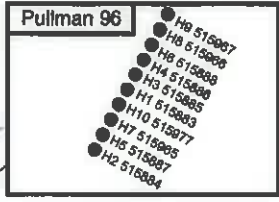




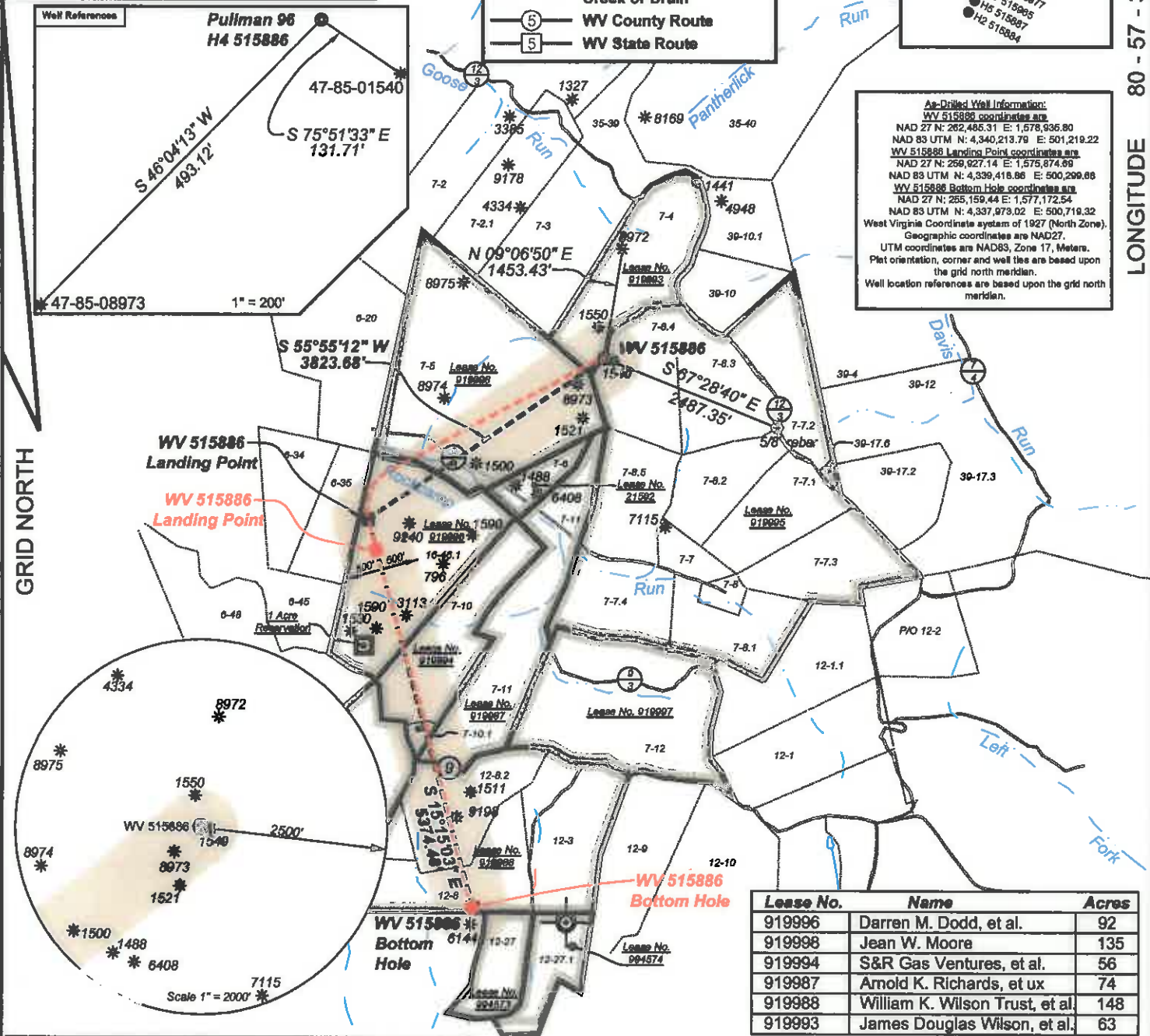
**WV 515886**  
**EQT Production Company**  
**Laurie Ann Haddox, et al**  
**360 Acres**

LATITUDE 39 - 15 - 00

- Proposed Gas Well
- Located Corner, as noted
- Surface Tract Lines
- Reference Line
- Lease Boundary
- Creek or Drain
- Ⓢ WV County Route
- Ⓢ WV State Route



**As-Drilled Well Information:**  
**WV 515886 coordinates are**  
 NAD 27 N: 262,483.31 E: 1,578,935.80  
 NAD 83 UTM N: 4,340,213.79 E: 501,219.22  
**WV 515886 Landing Point coordinates are**  
 NAD 27 N: 269,927.14 E: 1,575,874.69  
 NAD 83 UTM N: 4,339,418.86 E: 500,299.68  
**WV 515886 Bottom Hole coordinates are**  
 NAD 27 N: 265,159.44 E: 1,577,172.54  
 NAD 83 UTM N: 4,337,978.02 E: 500,719.32  
 West Virginia Coordinate system of 1927 (North Zone).  
 Geographic coordinates are NAD27.  
 UTM coordinates are NAD83, Zone 17, Meters.  
 Plat orientation, corner and well ties are based upon the grid north meridian.  
 Well location references are based upon the grid north meridian.



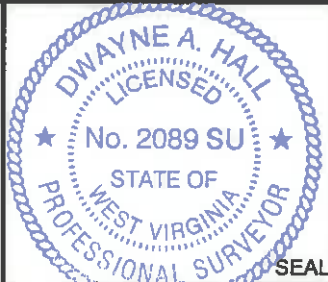
Lease No.	Name	Acres
919996	Darren M. Dodd, et al.	92
919998	Jean W. Moore	135
919994	S&R Gas Ventures, et al.	56
919987	Arnold K. Richards, et ux	74
919988	William K. Wilson Trust, et al	148
919993	James Douglas Wilson, et al.	63

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



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



FILE NO: 243-14  
 DRAWING NO: 243-14 Pullman 96 H4.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: May 18 20 16  
 OPERATOR'S WELL NO. 515886  
 API WELL NO  
 47 - 85 - 10217  
 STATE COUNTY PERMIT

WELL TYPE:  OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  
 (IF GAS) PRODUCTION:  STORAGE  DEEP  SHALLOW  
 LOCATION: ELEVATION: As Built: 1182.8' WATERSHED: Goose Run of Rockcamp Run QUADRANGLE: Pullman  
 DISTRICT: Union COUNTY: Ritchie  
 SURFACE OWNER: James H. & Wilma J. Wilson ACREAGE: 360.069  
 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 6,398

WELL OPERATOR: EQT Production Company DESIGNATED AGENT: Rex C. Ray  
 ADDRESS: PO Box 280 / 115 Professional Place ADDRESS: PO Box 280 / 115 Professional Place  
 Bridgeport, WV 26330 Bridgeport, WV 26330

01/27/2017

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
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Coal							
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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	.375	1378	1102	Class A	1.18
Fresh Water	13 3/8	17 1/2	.38	2700	2160	See Variance	1.20
Coal							
Intermediate	9 5/8	12 3/8	.395	7900	6320	See Variance	1.18
Production	5 1/2	8 1/2	.361	12640	10112	Class H	1.25/2.06
Tubing	2 3/8	NA	.19	7700			
Liners							

**PACKERS**

**VOID**

Kind:				
Sizes:				
Depths Set:				

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