



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

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
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 515884
47-085-10207-00-00

Adding Additional Lease

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: 515884
Farm Name: WILSON, JAMES H. & WILMA J.
U.S. WELL NUMBER: 47-085-10207-00-00
Horizontal 6A / Horizontal 6A Well - 1
Date Issued: 12/30/2016

Promoting a healthy environment.

01/06/2017



June 8, 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 47-085-10207

Dear Mr. Smith,

Please accept the attached updates for the above referenced permit. Upon inspection of our as-drilled plat, we noted the curve geometry crossed into 1 additional lease, #919993. Enclosed is an updated WW-6A1, WW-6B, mylar plat and rec plan reflecting corrections to update the permit file to be consistent with the as-drilled well bore.

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

Sincerely,

A handwritten signature in blue ink, appearing to read 'Vicki Roark'.

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: 515884 Well Pad Name: PUL96

3) Farm Name/Surface Owner: James H. & Wilma J. Wilson Public Road Access: 12/3

4) Elevation, current ground: 1182.0 Elevation, proposed post-construction: 1182.0

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, 6380', 54', 2190 PSI

8) Proposed Total Vertical Depth: 6380

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 12478

11) Proposed Horizontal Leg Length: 5221

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

13) Method to Determine Fresh Water Depths: From offset wells

14) Approximate Saltwater Depths: None reported

15) Approximate Coal Seam Depths: None reported

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

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

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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	A-500	78.6	40	40	44.84 ft ³ / CTS
Fresh Water	13 3/8	New	J-55	54.5	670	670	718.8 ft ³ / CTS
Coal							
Intermediate	9 5/8	New	A-500	40	2575	2575	1165.84 ft ³ / CTS
Production	5 1/2	New	P-110	20	12473	12473	500' above top producing zone
Tubing	2 3/8		J-55	4.7		May not be run, if run set 40' above top perf or 80° 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./k)
Conductor	20	24	.375	1378	1102	Class A	1.18
Fresh Water	13 3/8	17 1/2	.38	2700	2160	Class A	1.20
Coal							
Intermediate	9 5/8	12 3/8	.395	3950	3160	Class A	1.18
Production	5 1/2	8 1/2	.361	12640	10112	Class H/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 6550'. Run log and set a solid cement plug. 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 disturbance

22) Area to be disturbed for well pad only, less access road (acres): no additional disturbance

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

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

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 (Class 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 (Class 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 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.

Office of Oil and Gas
JUN 14 2017
WV Department of
Environmental Protection

**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
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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

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

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 WV Department of Environmental Protection
 Page 1 of 2

47-085-10207

WW-6A1 attachment

Operator's Well No.

515884

Lease No.	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>919995</u>	<u>Laurie Ann Haddock, et al (current royalty owner)</u>		***	
	James A. Wilson, et ux (original lessor)	R. W. Richards		LB79/542
	R. W. Richards	J. E. Richards and C. W. Richards		LB80/78
	J. E. Richards and C. W. Richards	Bolyard Oil & Gas, LTD		LB169/136
	Bolyard Oil & Gas, LTD	Sheffield Exploration Co.		LB189/521
	Sheffield Exploration Co.	M. S. Oil Co. (69.513% of working interest) and Applied Mechanics Corp. (30.487% of working interest)		LB208/268
	M. S. Oil Co. (69.513%)	Applied Mechanics Corp.		LB222/836
	Applied Mechanics Corporation, et al	FS Limited Partnership		AB274/80
	FS Limited Partnership	EQT Production Co.		AB274/102
<u>919993</u>	<u>Ian David Wilson, et al (current royalty owner)</u>		***	
	Effie E. Wilson and James Wilson (original lessor)	J.E. Richards		LB79/346
	J.E. Richards	J. E. Richards and C.W. Richards		LB79/407
	J.E. Richards and C.W. Richards	P.O. Burgy, B.S. Marshall, L.B. Burgy & Rollo Riggs		LB81/279
	P.O. Burgy, B.S. Marshall, L.B. Burgy & Rollo Riggs	J. E. Richards and C.W. Richards		LB123/303
	J. E. Richards and C.W. Richards	Applied Mechanics, et al		LB206/8
	Applied Mechanics Corporation, et al	FS Limited Partnership		AB274/80
	FS Limited Partnership	EQT Production Co.		AB274/102
<u>919997</u>	<u>Arnold K. Richards (current royalty owner)</u>		***	
	Archie C. Richards, et al	J. E. Richards		LB80/447
	J. E. Richards	C. W. Richards (50%)		LB136/24
	C. W. Richards and J. E. Richards	Applied Mechanics Corp.		LB206/8
	Applied Mechanics Corp., Gary C. Richards, Mary Jane Richards, Mary Lee Richards, Charles L. Stout & Marilyn J. Stout	FS Limited Partnership		AB274/80
	FS Limited Partnership	EQT Production Co.		AB274/102

*** 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.

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01/06/2017



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, 515884, 47-085-10207
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,

A handwritten signature in blue ink, appearing to read 'Vicki L', is written over the word 'Sincerely,'.

Vicki Roark
Permitting Supervisor-WV

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JUN 10 2016

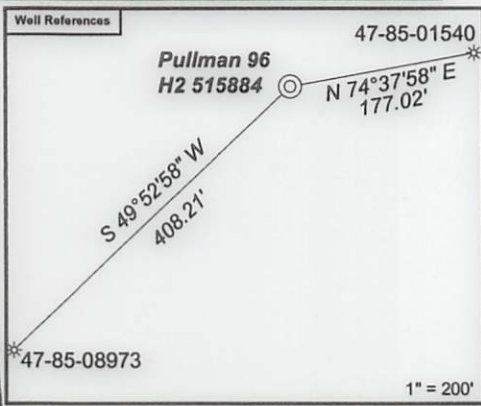
WV Department of
Environmental Protection

WV 515884
EQT Production Company
Laurie Ann Haddox, et al
360 Acres

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

LATITUDE 39 - 15 - 00

- Pullman 96**
- H10, 515977
 - H7, 515965
 - H5, 515887
 - H2, 515884

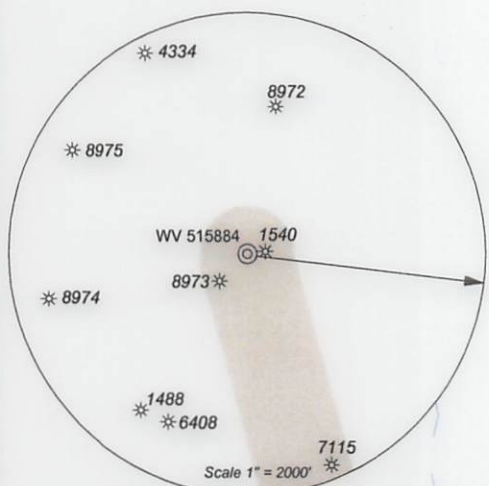
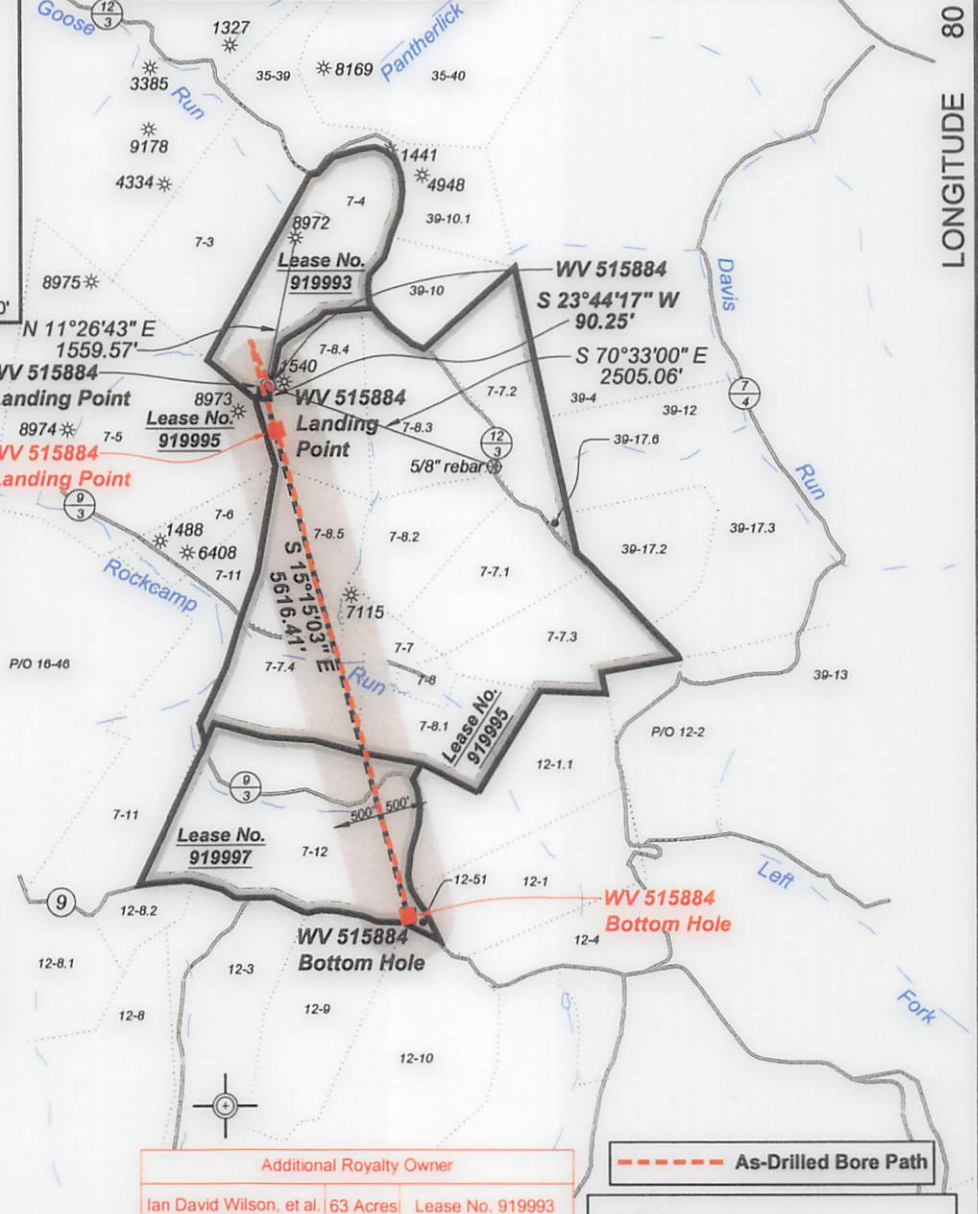


As-Drilled Well Information:
 WV 515884 coordinates are
 NAD 27 N: 262,406.23 E: 1,578,892.82
 NAD 83 UTM N: 4,340,189.48 E: 501,206.52
 WV 515884 Landing Point coordinates are
 NAD 27 N: 261,941.83 E: 1,578,972.52
 NAD 83 UTM N: 4,340,048.41 E: 501,233.17
 WV 515884 Bottom Hole coordinates are
 NAD 27 N: 256,906.03 E: 1,580,339.92
 NAD 83 UTM N: 4,338,521.25 E: 501,675.36
 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.

GRID NORTH

LONGITUDE 80 - 57 - 30

14256'



Additional Royalty Owner
 Ian David Wilson, et al. 63 Acres Lease No. 919993

As-Drilled Bore Path

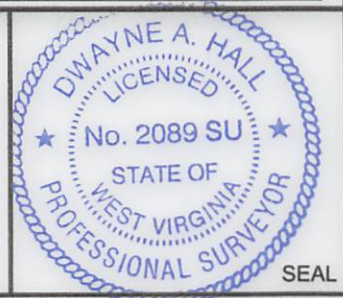
Lease No.	Acres	Owner
919997	98	Arnold K. Richards

(⊕) 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 H2.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

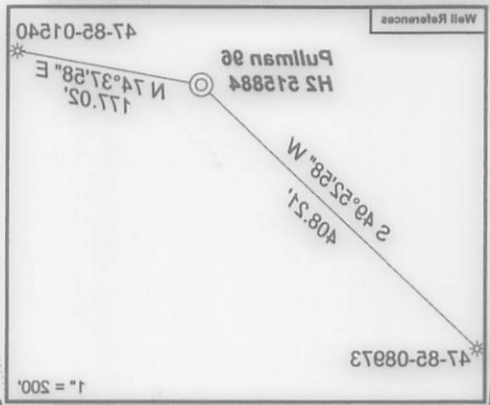
DATE: May 11 20 16
 OPERATOR'S WELL NO. 515884
 API WELL NO
 47 - 85 - 10207
 STATE COUNTY PERMIT

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 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

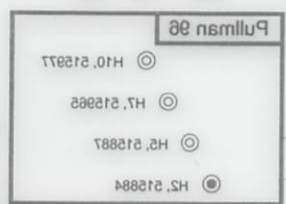
01/06/2017

Laurie Ann Habdax, et al
EQT Production Company
360 Acres
WV 515884

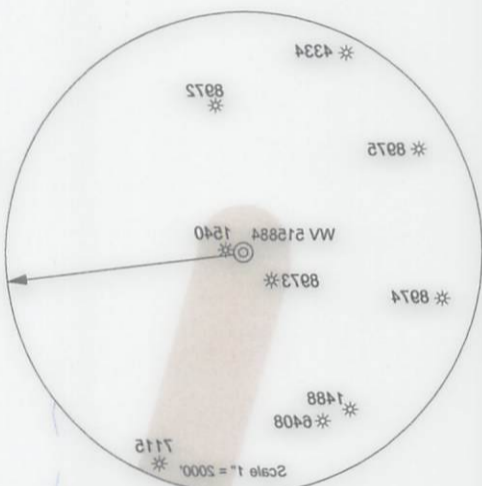
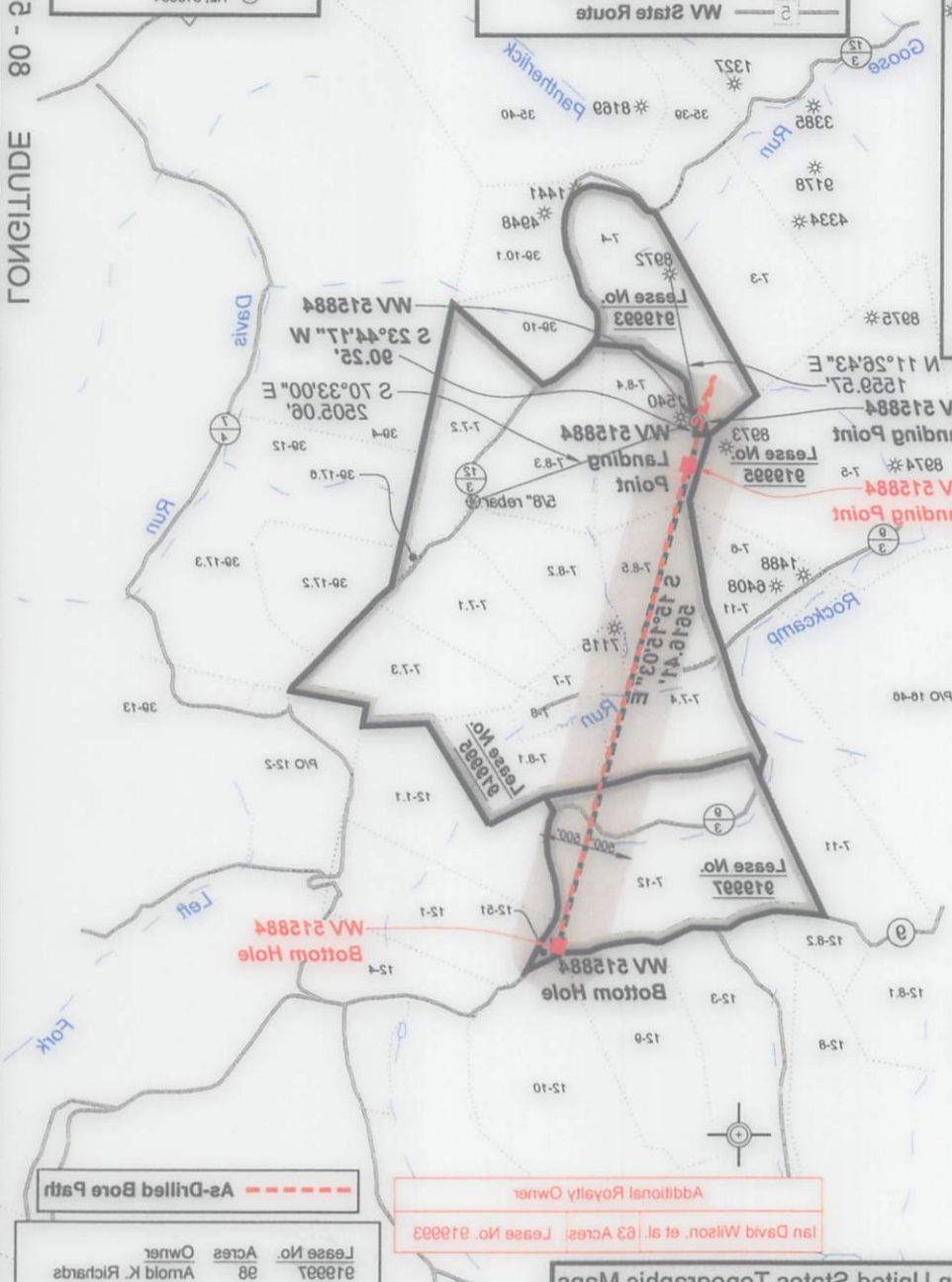


Well location references are based upon the grid north meridian.
 The grid north meridian.
 UTM coordinates are NAD83, Zone 17, Meters.
 Geographic coordinates are NAD27.
 West Virginia Coordinate system of 1927 (North Zone).
 NAD 83 UTM N: 4,338,521.25 E: 501,875.38
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 WV 515884 Bottom Hole coordinates are
 NAD 27 N: 4,340,048.41 E: 501,233.17
 WV 515884 Landing Point coordinates are
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 NAD 27 N: 287,941.83 E: 1,278,925.25
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- Proposed Gas Well
- Located Corner, as noted
- Surface Tract Lines
- Reference Line
- Lease Boundary
- Creek or Drain
- WV County Route
- WV State Route



LONGITUDE 80 - 21 - 30
 LATITUDE 39 - 15 - 00



Additional Royalty Owner
 Ian David Wilson, et al, 63 Acres, Lease No. 919993

As-Drilled Bore Path
 Lease No. 919993 Acres Owner
 98 Arnold K. Richards

() 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.
[Signature]
 P.S. 20892U



FILE NO: 243-14
 DRAWING NO: 243-14 Pullman 98 H5.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 11 2016
 OPERATORS WELL NO: 515884
 API WELL NO
 STATE COUNTY PERMIT
 47 85 - 10207

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL

(IF GAS) PRODUCTION: STORAGE DEEP SHALLOW

LOCATION: ELEVATION: Proposed: 1182' Original: 1194' WATERSHED: Goose Run of Rockcamp Run QUADRANGLE: Pullman

DISTRICT: Richrie COUNTY: Richrie

ROYALTY OWNER: Laurie Ann Habdax, et al LEASE NO: 919995 ACREAGE: 360

SURFACE OWNER: James H. & Wilms J. Wilson ACREAGE: 40.089

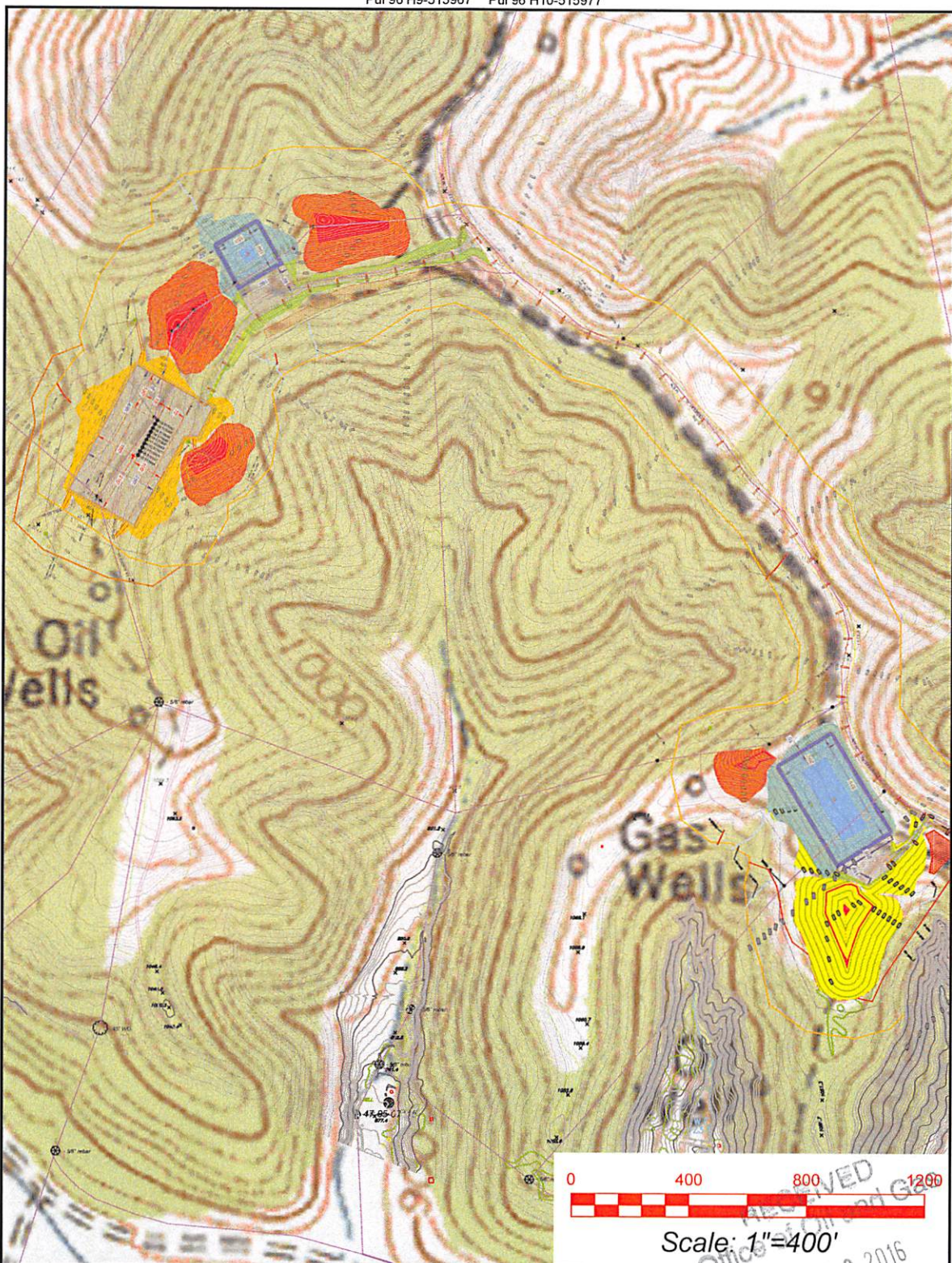
PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION

PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY)

PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus ESTIMATED DEPTH: TVD 6399'

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

11/06/2017



Pullman 7.5' USGS QUADRANGLE		Proposed Disturbance Area	
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

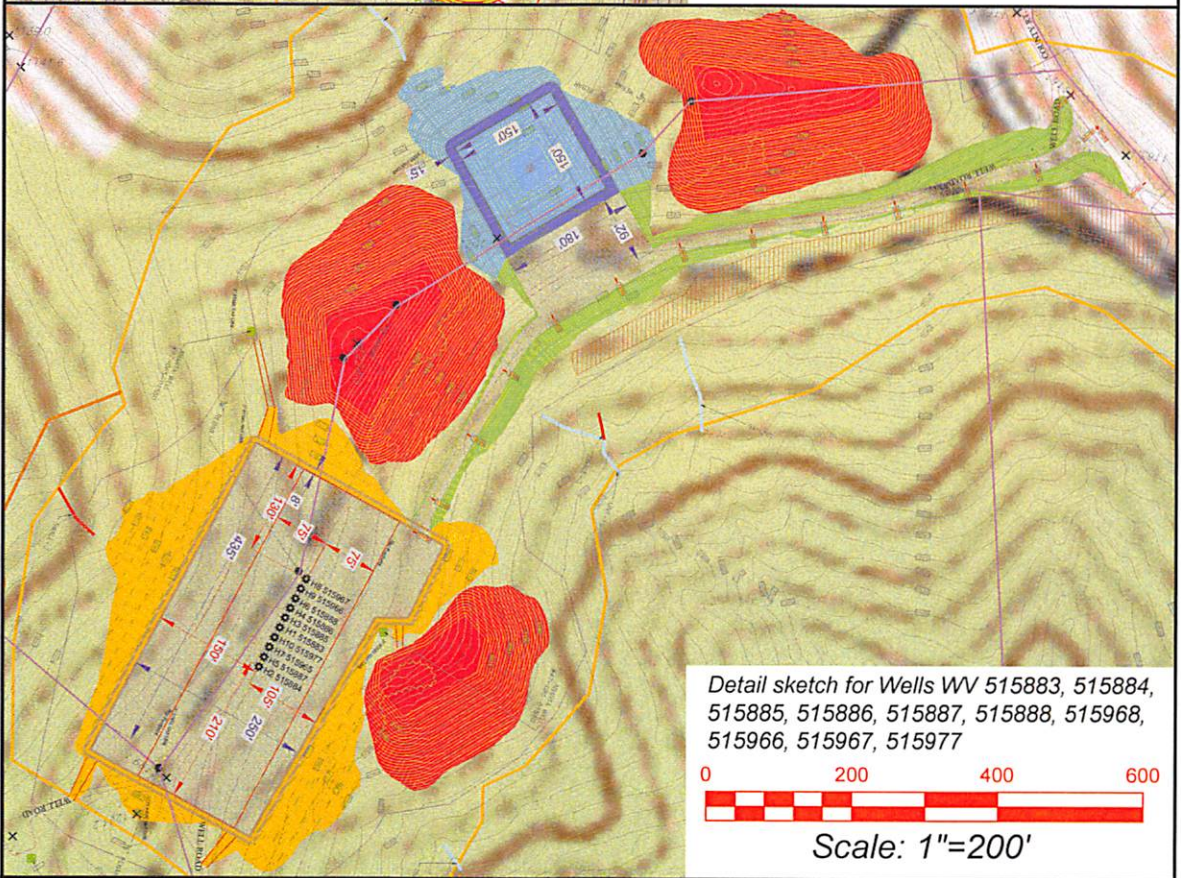
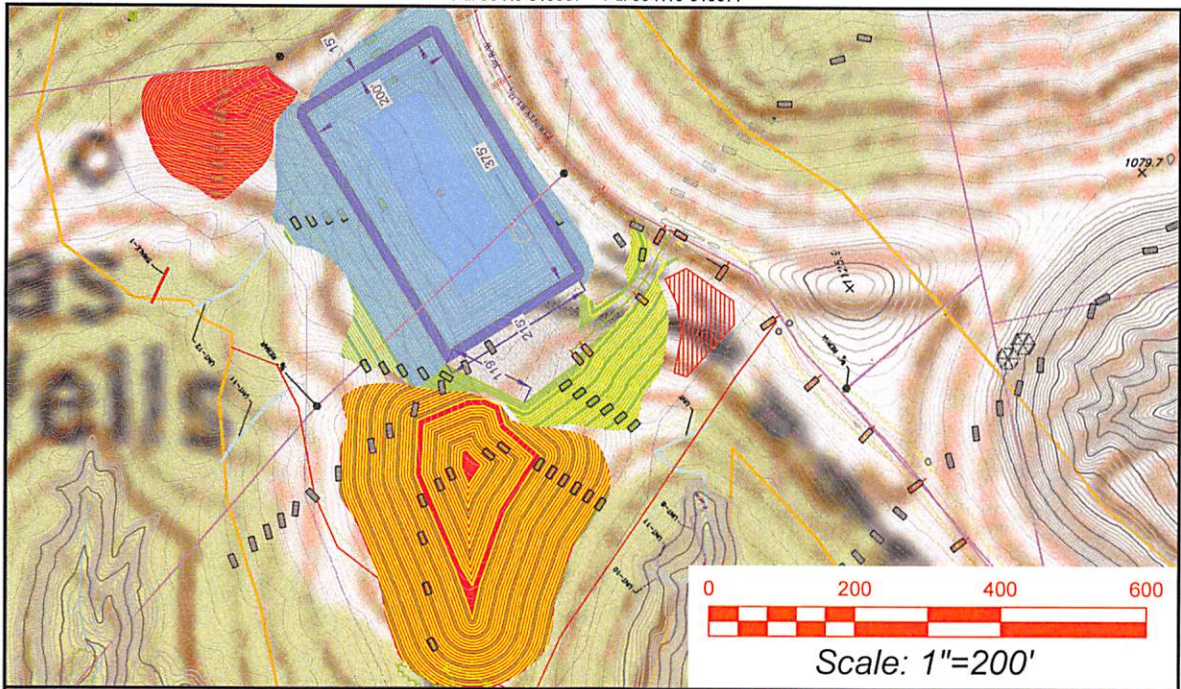
Note: SEE SITE PLAN OF PULLMAN 96 FOR COMPLETE GRADING & DRAINAGE CONSTRUCTION INCLUDING EROSION & SEDIMENT CONTROL DETAILS, ETC.

Office of Oil and Gas
 WV Department of Environmental Protection



SURVEYING AND MAPPING SERVICES PERFORMED BY:
ALLEGHENY SURVEYS, INC.
 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

01/06/2017



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

Pullman 7.5' USGS QUADRANGLE		Proposed Disturbance Area	
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
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DRAWN BY: Dwayne A. Hall, PS	DATE: April 11, 2016	FILE NO: 243-14	DRAWING FILE NO: 243-14 Rec Plan

Note: SEE SITE PLAN OF PULLMAN 96 FOR COMPLETE GRADING & DRAINAGE CONSTRUCTION INCLUDING EROSION & SEDIMENT CONTROL DETAILS, ETC.



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 Fax: (304) 649-8608 Birch River, WV 26610