



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 Well - 1

EQT PRODUCTION COMPANY
120 PROFESSIONAL PLACE

BRIDGEPORT, WV 26330

Re: Permit Modification Approval for 515887

Additional Lease Added

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: 515887
Farm Name: WILSON, JAMES H. & WILMA J.
U.S. WELL NUMBER: **47-85-10211**
/ Horizontal 6A Well - 1
Date Issued: 8/11/2016

Promoting a healthy environment.

08/12/2016



4708510211 MOD

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 47-085-10211

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: 515887 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 X Oil _____ Underground Storage _____

Other _____

(b) If Gas Shallow X Deep _____

Horizontal X

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus, 6372', 54', 2190 PSI

4708510211 MW

8) Proposed Total Vertical Depth: 6372

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 11497

11) Proposed Horizontal Leg Length: 4157

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 X

(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	669	669	718.8 ft ³ / CTS
Coal							
Intermediate	9 5/8	New	A-500	40	2577	2577	1165.84 ft ³ / CTS
Production	5 1/2	New	P-110	20	11497	11497	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							

4708510211 MOP

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 4606'. 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.

4708510211 MOD

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.

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*Note: Attach additional sheets as needed.

08/12/2016

**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

4708510211 Mod

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 RECEIVED
 By: Victoria J Roark Office of Oil and Gas
 Its: Permitting Supervisor JUN 10 2016

WW-6A1 attachment

Operator's Well No.

515887

Lease No.	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
919995	<u>Laurie Ann Haddox, 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
919993	<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

*** 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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08/12/2016



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, 515887, 47-085-10211
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

4708510211 MSO

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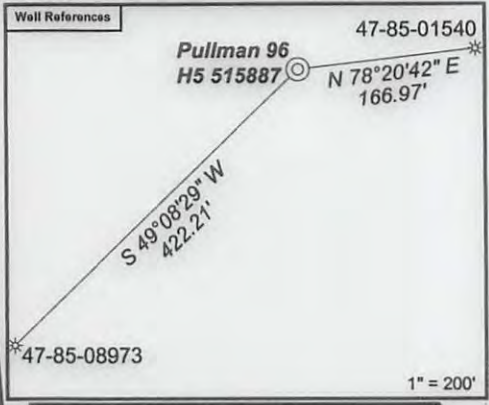
WV 515887
EQT Production Company
Laurie Ann Haddox, et al
360 Acres

- ⊙ Proposed Gas Well
- Located Corner, as noted
- Surface Tract Lines
- Reference Line
- Lease Boundary
- Creek or Drain
- ⑤ WV County Route
- ⑤ WV State Route

LATITUDE 39 - 15 - 00

Pullman 96

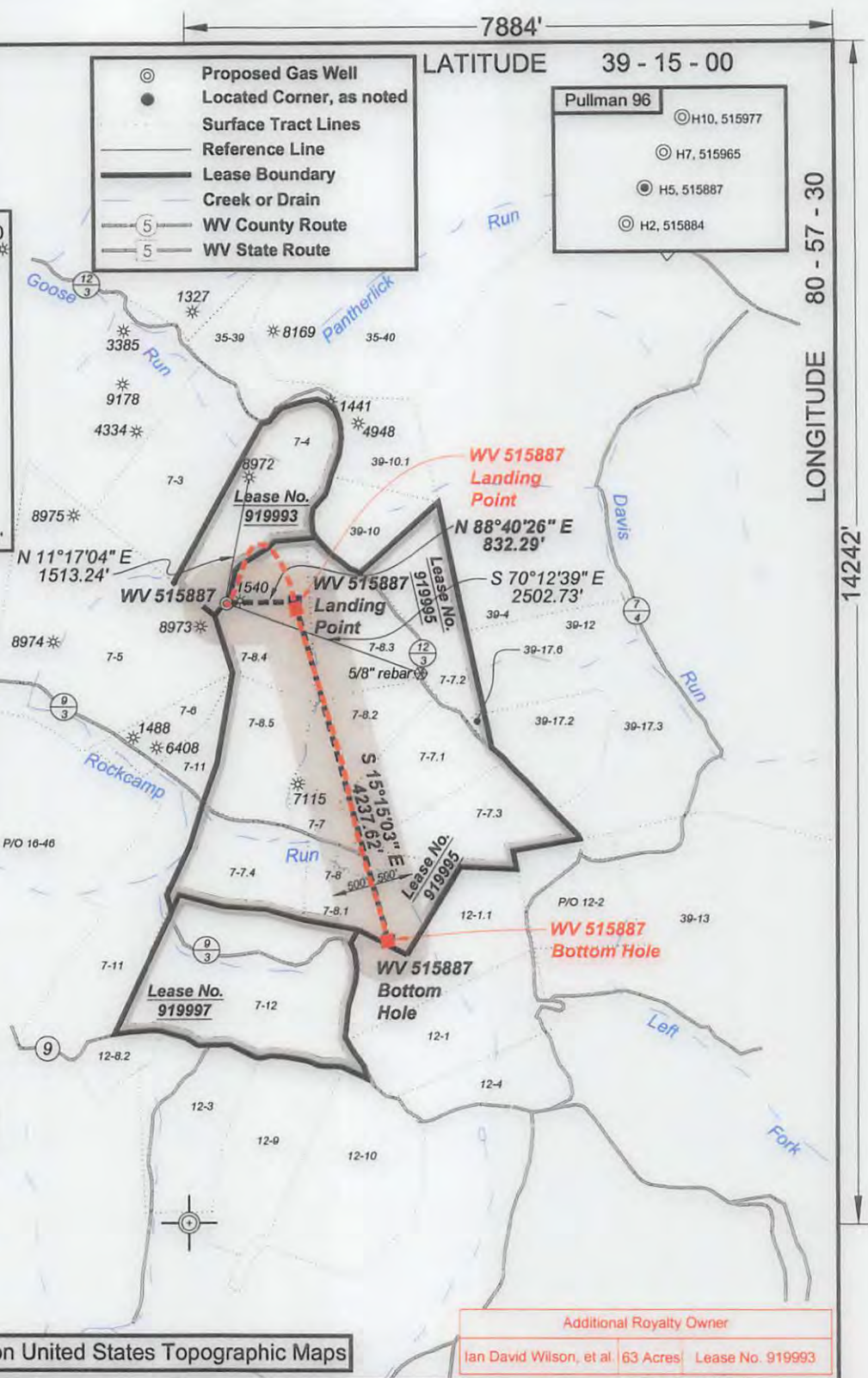
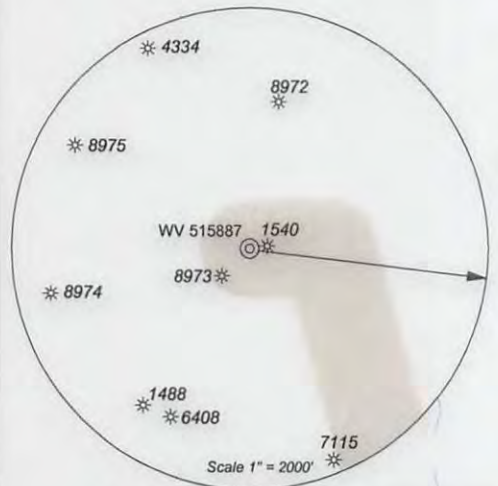
- ⊙ H10, 515977
- ⊙ H7, 515965
- ⊙ H5, 515887
- ⊙ H2, 515884



As-Drilled Well Information:
 WV 515887 coordinates are
 NAD 27 N: 262,419.41 E: 1,578,899.99
 NAD 83 UTM N: 4,340,193.53 E: 501,208.64
 WV 515887 Landing Point coordinates are
 NAD 27 N: 262,353.78 E: 1,579,741.63
 NAD 83 UTM N: 4,340,177.83 E: 501,465.38
 WV 515887 Bottom Hole coordinates are
 NAD 27 N: 258,347.76 E: 1,580,840.20
 NAD 83 UTM N: 4,338,963.01 E: 501,820.43

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



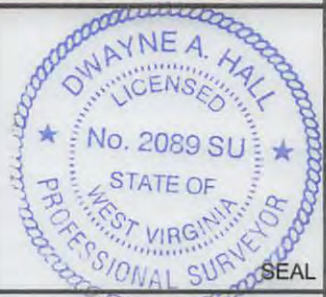
Additional Royalty Owner
 Ian David Wilson, et al, 63 Acres, Lease No. 919993

(⊙) 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 H5.dwg
 SCALE: 1" = 2000'
 MINIMUM DEGREE OF ACCURACY: 1:2500
 PROVEN SOURCE OF ELEVATION: NGS CORS Station

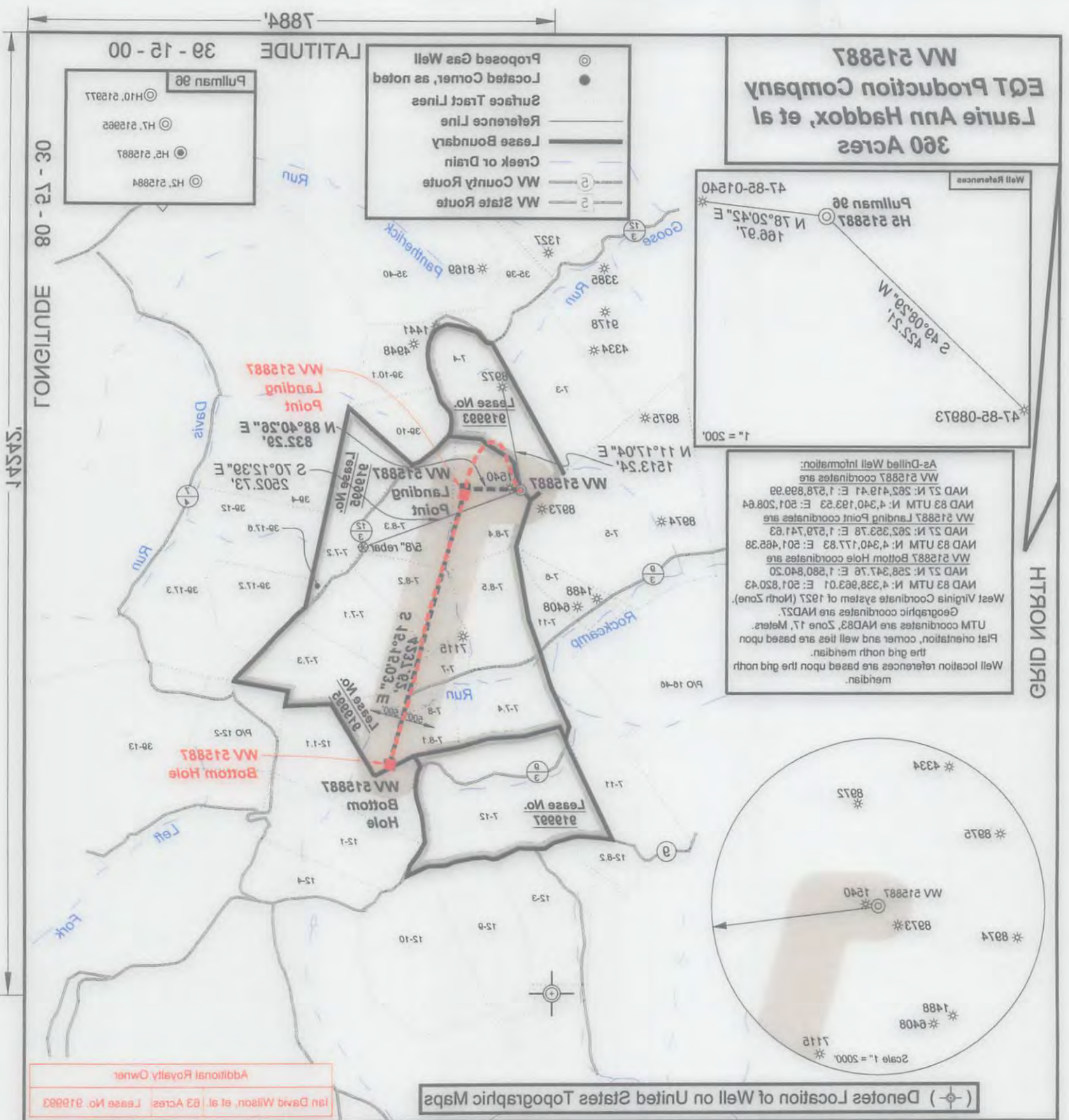
STATE OF WEST VIRGINIA
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS DIVISION

DATE: April 13 20 16
 OPERATOR'S WELL NO. 515887
 API WELL NO
 47 - 85 - 10211 HGA
 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: 46.069
 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 6,396

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

08/12/2016



WV 515887
EQT Production Company
Laurie Ann Haddox, et al
360 Acres

As-Detailed Well Information:
 WV 515887 coordinates are
 NAD 83 UTM N: 4,340,177.83 E: 501,468.38
 NAD 83 UTM N: 4,340,183.53 E: 501,508.64
 NAD 83 UTM N: 4,340,193.53 E: 501,508.64
 WV 515887 Landing Point coordinates are
 NAD 83 UTM N: 4,340,177.83 E: 501,468.38
 NAD 83 UTM N: 4,340,177.83 E: 501,468.38
 WV 515887 Bottom Hole coordinates are
 NAD 83 UTM N: 4,340,177.83 E: 501,468.38
 NAD 83 UTM N: 4,340,177.83 E: 501,468.38
 West Virginia Coordinate system of 1927 (North Zone).
 Geographic coordinates are NAD83.
 UTM coordinates are NAD83, Zone 17, Meter.
 Plat orientation, corner and well ties are based upon
 the grid north meridian.
 Well location references are based upon the grid north
 meridian.

Additional Royalty Owner
 Ian David Wilson, et al, 83 Acres, Lease No. 919993

() 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. 508929



DATE: April 13 2016
 OPERATORS WELL NO. 515887
 API WELL NO.
 STATE COUNTY PERMIT

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

FILE NO.: 243-14
 DRAWING NO.: 243-14 Pulman 98 H.5.dwg
 SCALE: 1" = 2000'
 MINIMUM DEGREE OF ACCURACY: 1:2500
 PROVEN SOURCE OF ELEVATION: NGS CORS Station

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL

(IF GAS) PRODUCTION: STORAGE DEEP SHALLOW

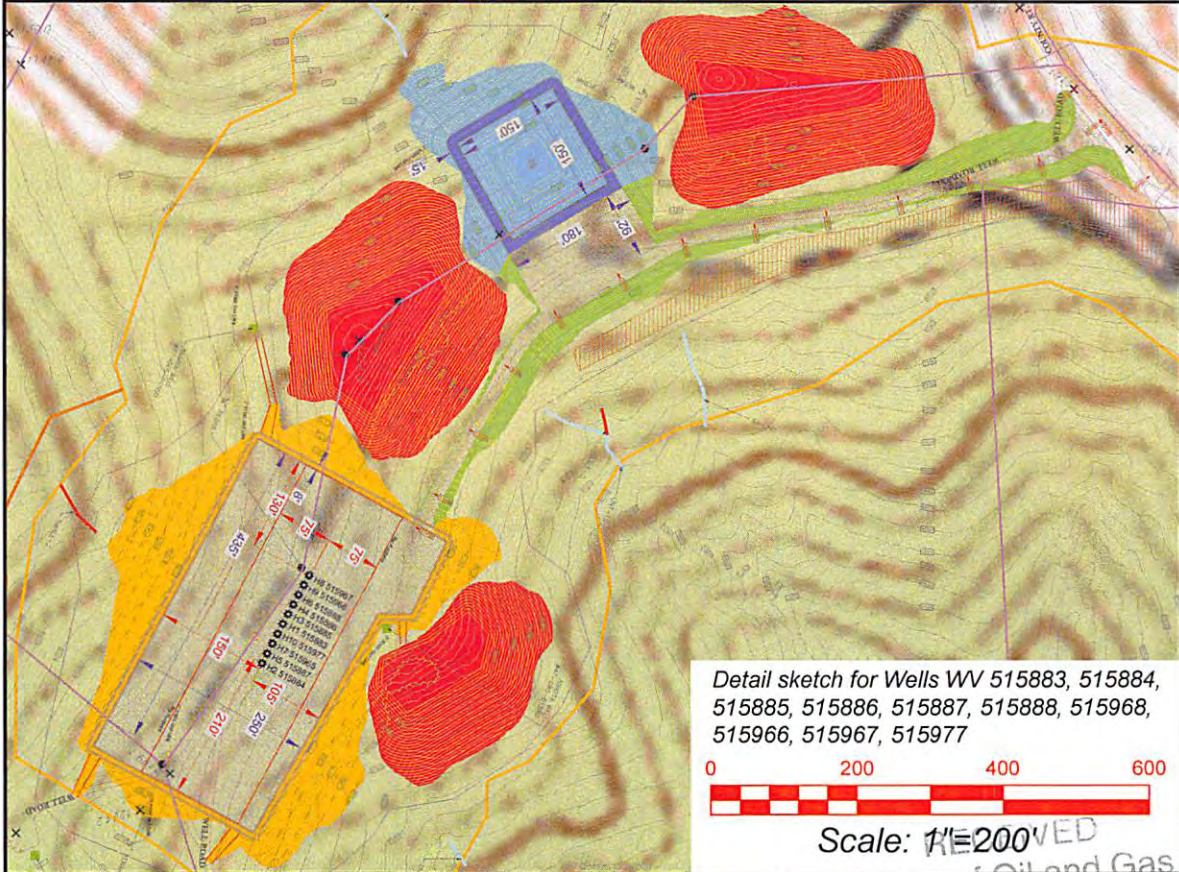
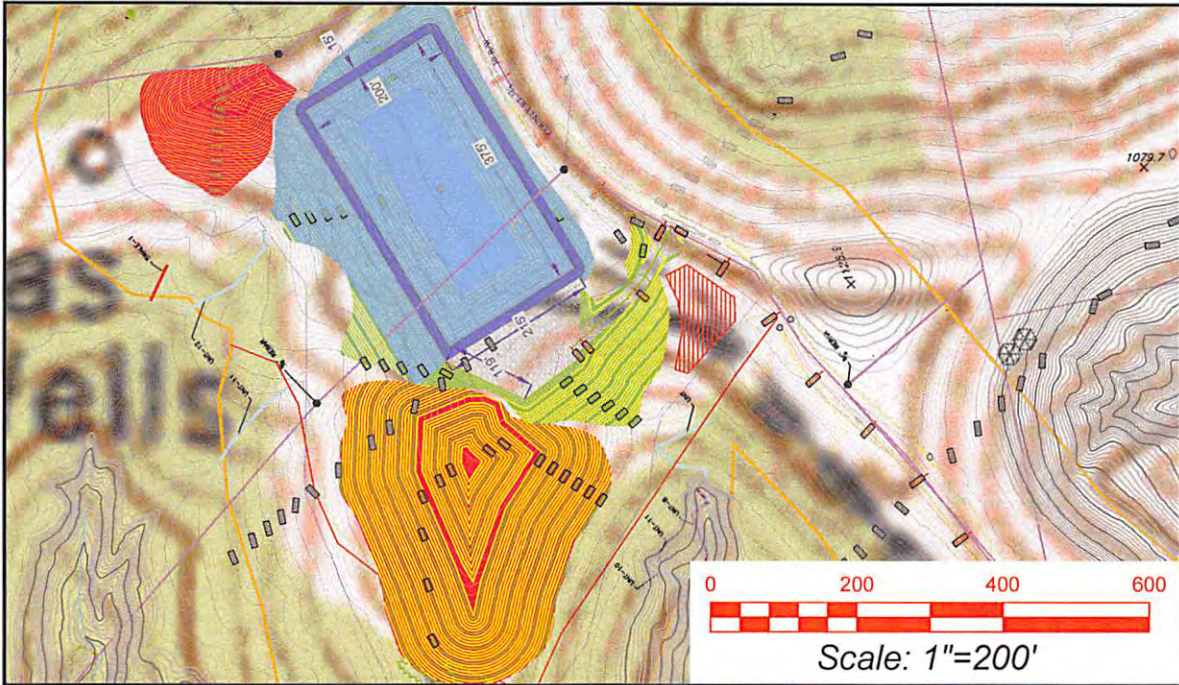
LOCATION: ELEVATION: WATERSHED Goose Run of Rockcamp Run QUADRANGLE: Pulman
 DISTRICT: Union COUNTY: Ritchie

SURFACE OWNER: James H. & Wilma J. Wilson
 ROYALTY OWNER: Laurie Ann Haddox, et al

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

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

08/12/2016



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

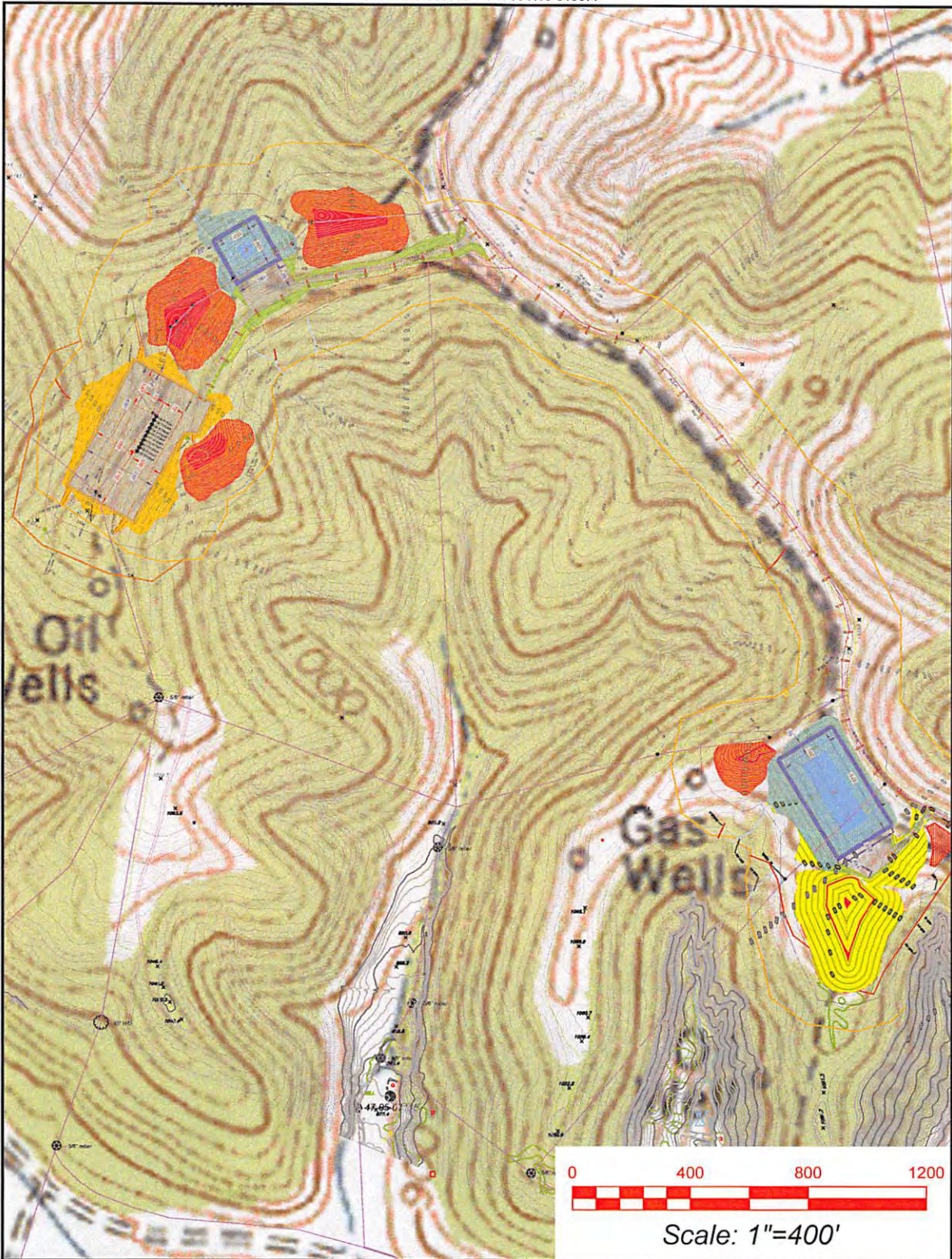
Note: SEE SITE PLAN OF PULLMAN 96 FOR COMPLETE GRADING & DRAINAGE CONSTRUCTION INCLUDING EROSION & SEDIMENT CONTROL DETAILS, ETC.



SURVEYING AND MAPPING SERVICES PERFORMED BY:
ALLEGHENY SURVEYS, INC.
 1-800-482-8606
 Birch River Office Phone: (304) 649-8606 Fax: (304) 649-8608
 237 Birch River Road P.O. Box 438 Birch River, WV 26610

WV Department of Environmental Protection
 47-085-10211
 08/12/2016

47-085-10211



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.

4708510211 MOP



SURVEYING AND MAPPING SERVICES PERFORMED BY:
ALLEGHENY SURVEYS, INC.
 1-800-482-8606
 Birch River Office Phone: (304) 649-8606 237 Birch River Road P.O. Box 438
 Fax: (304) 649-8608 Birch River, WV 26610

08/12/2016

47-085-10211