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

May 19, 2015

EQT PRODUCTION COMPANY
120 PROFESSIONAL PLACE
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 8510134, Well #: 513758

Extend 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

05/22/2015

4708510134
MOD2

April 14, 2015

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

Re: Modification to 47-085-10134

Dear Mr. Smith,

Enclosed is a new WW-6B, schematics, WW6A1, Mylar plat for the above API #, signed by the inspector. EQT would like to extend the lateral portion of the well.

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

Sincerely,

Vicki Roark
Permitting Supervisor-WV

Enc.

Received
APR 21 2015
Office of Oil and Gas
WV Dept. of Environmental Protection

The inspector signed the 6B form prior to the DEP posting a new form. I have included the new form and the inspector signed form.

Vicki

EQT Production 115 Professional Place I P.O. Box 280 I Bridgeport, WV 26330
T 304.848.0000 I F 304.848.0040 I www.eqt.com

05/22/2015

WW - 6B
(9/13)

47-085-10134
M002

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION

1) Well Operator: EQT Production Company | 306686 (Operator ID) | 085 (County) | 4 (District) | 526 (Quadrangle)

2) Operator's Well Number: 513758 Well Pad Name: OXF163

3) Farm Name/Surface Owner : Pierce Public Road Access: CR 7/18

4) Elevation, current ground: 1,175.0 Elevation, proposed post-construction: 1,158.5

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 Thicknesses and Associated Pressure(s):

Target formation is Geneseo at a depth of 6480' with the anticipated thickness to be 35 feet and anticipated target pressure of 2190 PSI

8) Proposed Total Vertical Depth: 6,480

9) Formation at Total Vertical Depth: Geneseo

10) Proposed Total Measured Depth 15,940

11) Proposed Horizontal Leg Length 7,220

12) Approximate Fresh Water Strata Depths: 176, 453, 517

13) Method to Determine Fresh Water Depth: By offset wells

14) Approximate Saltwater Depths: 1,156

15) Approximate Coal Seam Depths: No Coal Seams Present

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?

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

DCN
4-15-2015
change lateral length

05/22/2015

WW - 6B
(3/13)

CASING AND TUBING PROGRAM

18)

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: for Drilling	INTERVALS: Left in Well	CEMENT: Fill- up (Cu.Ft.)
Conductor	20	New	MC-50	81	40	40	38 C.T.S.
Fresh Water	13 3/8	New	MC-50	54	1,055	1,055	914 C.T.S.
Coal	-	-	-	-	-	-	-
Intermediate	9 5/8	New	MC-50	40	3,036	3,036	1,184 C.T.S.
Production	5 1/2	New	P-110	20	15,940	15,940	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							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20	24	0.375	-	Construction	1.18
Fresh Water	13 3/8	17 1/2	0.38	2,480	* See Note 2	1.21
Coal	-	-	-	-	-	-
Intermediate	9 5/8	12 3/8	0.395	3,590	* See Note 2	1.21
Production	5 1/2	8 1/2	0.361	12,640	-	1.27/1.86
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 1,000' above kick off point, which is at least 500' above the shallowest production zone, to avoid communication.
Note 2: Reference Variance 2014-17.

DCM
4-15-2015

WW - 6B
(4/15)

API NO. 47 - 85 - 10134
OPERATOR WELL NO. 513758
Well Pad Name: OXF163

CASING AND TUBING PROGRAM

18)

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.)
Conductor	20	New	MC-50	81	40	40	38 C.T.S.
Fresh Water	13 3/8	New	MC-50	54	1,055	1,055	914 C.T.S.
Coal	–	–	–	–	–	–	–
Intermediate	9 5/8	New	MC-50	40	3,036	3,036	1,184 C.T.S.
Production	5 1/2	New	P-110	20	15,940	15,940	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							

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	0.375	-	18	Construction	1.18
Fresh Water	13 3/8	17 1/2	0.38	2,480	2184	* See Note 2	1.21
Coal							
Intermediate	9 5/8	12 3/8	0.395	3,590	3160	* See Note 2	1.21
Production	5 1/2	8 1/2	0.361	12,640	10112	-	1.27/1.86
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 1,000' above kick off point, which is at least 500' above the shallowest production zone, to avoid communication.
Note 2: Reference Variance 2014-17. (Attached)

WW - 6B

(3/13)

4708510134

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

Drill and complete a new horizontal well in the Geneseo formation. The vertical drill to go down to an approximate depth of 3576'. Then kick off the horizontal leg into the Geneseo using a slick water frac.

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): 24.6

22) Area to be disturbed for well pad only, less access road (acres): 14.6

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 1000' from KOP to Int csg shoe

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. 0.4% 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. 0.4% 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 1 Cement): 0.2-0.7% Lignosulfonate (Retarder). Lengthens thickening time. 0.3% CFR (dispersant). Makes cement easier to mix.

Tail (Type H Cement): 0.25-0.40% Lignosulfonate (Retarder). Lengthens thickening time. 0.2-0.3% CFR (dispersant). This is to make the cement easier to mix. 60 % Calcuim Carbonate. Acid solubility. 0.4-0.6% Halad (fluid loss). Reduces amount of water lost to formation.

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. To ensure that there is no fill, short trip two stands with no circulation. If there is fill, bring compressors back on and circulate hole clean. 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.

Received

APR 21 2015

Office of Oil and Gas

WV Dept. of Environmental Protection

*Note: Attach additional sheets as needed.

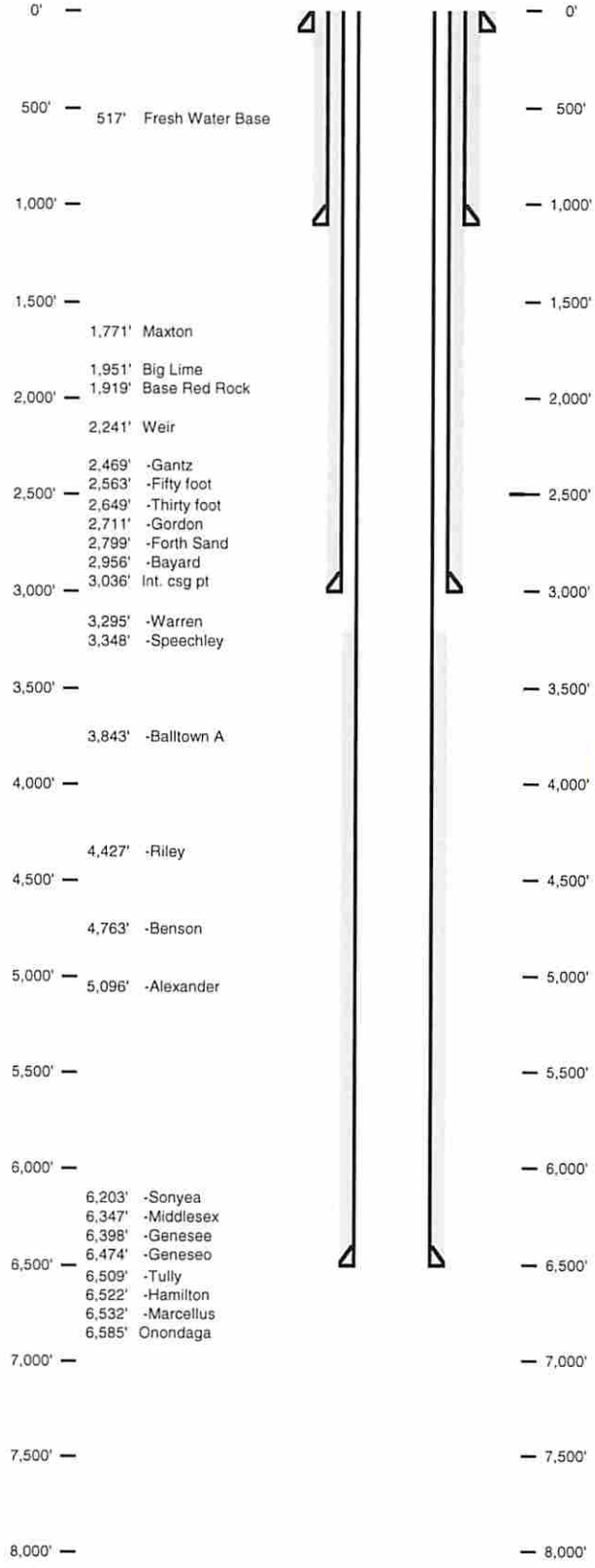
05/22/2015

47085 10134

Well Schematic
EQT Production

Well Name	513758 (OXF163H3)
County	Ritchie
State	West Virgina

Elevation KB:	1172
Target	Geneseo
Prospect	
Azimuth	162
Vertical Section	8537



Hole Size 24" - 20" Conductor at 40'
Bit Size 17.5"

TOC @ Surface
13 3/8", MC-50, 54.5# @ 1,055' ft MD
Bit Size 12.375"

TOC @ Surface
9 5/8", MC-50, 40# @ 3,036' ft MD
Bit Size 8.5"

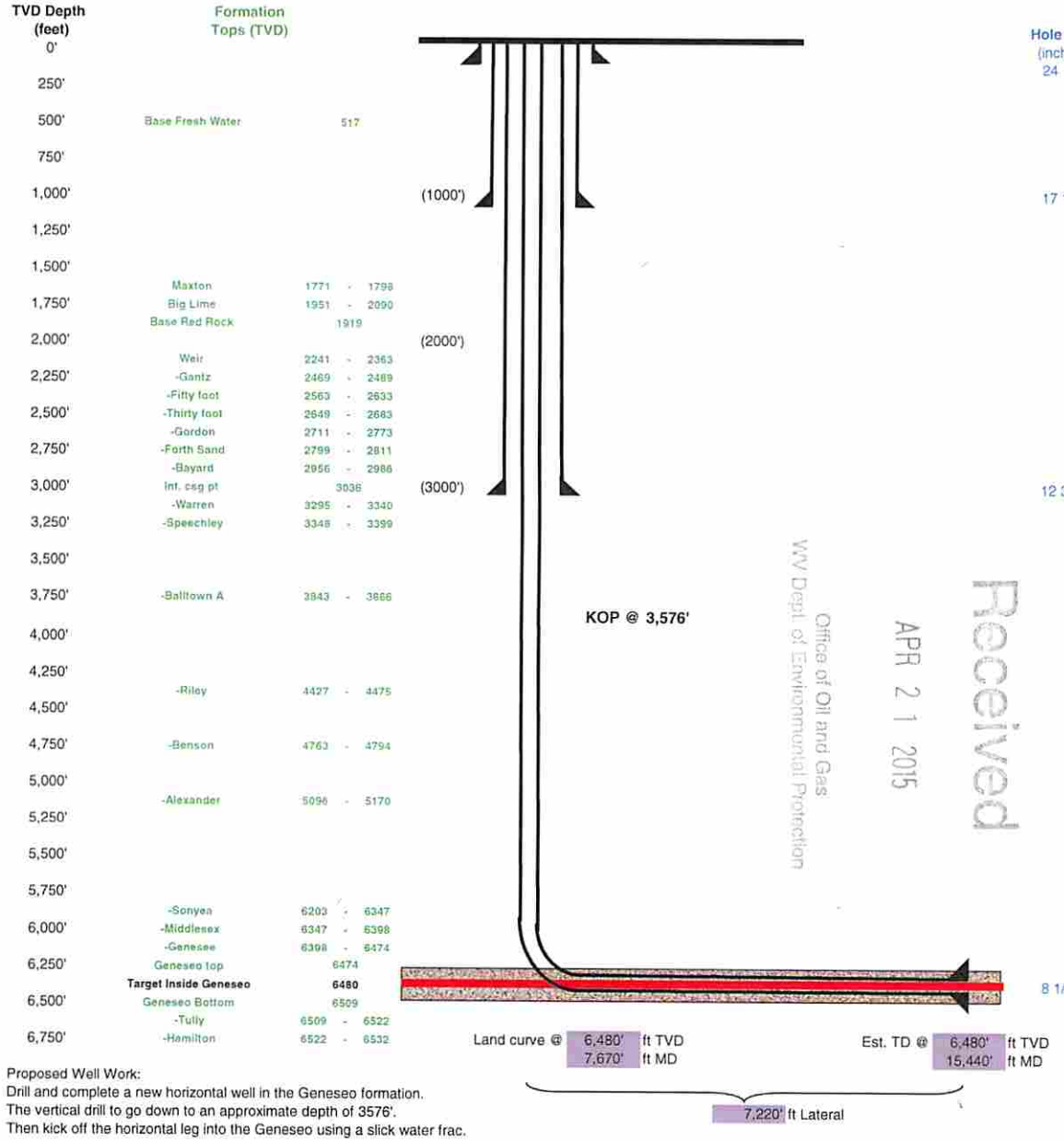
KOP = 3,576' ft MD
10 Deg DLS

Land @ 7,670' ft MD
6,480' ft TVD

5 1/2", P-110, 20# 15,440' ft MD
6,480' ft TVD

Well 513758 (OXF163H3)
EQT Production
Oxford
Ritchie West Virgina

Azimuth 162
Vertical Section 8537



Hole Size (inches)	Casing Type	Size (inches)	Wt (ppf)/Grade
24	Conductor	20	81#/MC-50
17 1/2	Surface	13 3/8	54#/MC-50
12 3/8	Intermediate	9 5/8	40#/MC-50
8 1/2	Production Casing	5 1/2	20#/P-110

Proposed Well Work:
Drill and complete a new horizontal well in the Geneseo formation.
The vertical drill to go down to an approximate depth of 3576'.
Then kick off the horizontal leg into the Geneseo using a slick water frac.

4708510134

MOD2

Well Number: 513758 (OXF163H3)

Casing and Cementing					Deepest Fresh Water: 517'
Type	**Conductor**	**Mine Protection**	**Surface**	**Intermediate**	**Production**
Hole Size, In.	24		17 1/2	12 3/8	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'**	**-**	**1,055'**	**3,036'**	**15,940'**
Depth, TVD	**40'**	**-**	**1,055'**	**3,036'**	**6,480'**
Centralizers Used	Yes	-	Yes	Yes	Yes
Weight/Grade	81#/MC-50	-	54#/MC-50	40#/MC-50	20#/P-110
New or Used	New	-	New	New	New
Pressure Testing	-	-	20% Greater than exp. Pressure	20% Greater than exp. Pressure	20% greater than exp. fracture pressure
After Fracture Pressure Testing	-	-	-	-	20% greater than exp. shut pressure
ID, in	19.25	-	12.615	8.835	4.778
Burst (psi)	-	-	2,480	3,590	12,640
Collapse (psi)	-	-	1,110	2,470	11,100
Tension (mlbs)	-	-	455	456	587
Cement Class	-	-	-	-	H
Cement Type	Construction	-	1	1	-
Cement Yield	1.18	-	1.21	1.21	1.27/1.86
Meets API Standards	-	-	Yes	Yes	Yes
WOC Time	-	-	Min. 8 hrs	Min. 8 hrs	Min. 8 hrs
Top of Cement (Planned)	Surface	-	Surface	Surface	3,236'
Fill (ft.)	40'	-	1,055'	3,036'	12,204'
Percent Excess	-	-	20	20	10
Est. Volume (cu ft)	38	-	914	1,184	3,084
Est. Volume (BBLS)	7	-	163	211	549

SSP

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05/22/2015

Tophole Final for Keane 2143

WEST VIRGINIA GEOLOGICAL PROGNOSIS

Horizontal Well

513758 (OXF163H3)

4708510134

MOD 2

Drilling Objectives:	Geneseo					
County:	Ritchie					
Quad:	Oxford					
Elevation:	1172 KB			1159 GL	proposed	
Surface location	**Northing:**	234477.3	**Easting:**	1619107.1		
Landing Point	**Northing:**	232817.3	**Easting:**	1617298.2	**TVD:**	6480
Toe location	**Northing:**	225950.7	**Easting:**	1619529.3	**TVD:**	6480
Recommended Azimuth	162 Degrees			**Recommended LP to TD:**	7,220'	

Proposed Logging Suite: Formation tops based off logging on pilot hole well 513756
Mudloggers to be on location at kickoff point to run samples and measure gas thru both the curve and lateral sections.

Recommended Gas Tests: 1800, 2050, 2600, Intm Csg. Pt., 3400, 4900, 5250, KOP, (Gas test at any mine void)
Gas test during any trip or significant downtime while drilling the lateral section.

Possible red rock bases at: 46,86,182,235,290,396,462,513,580, 643,704,802,864,916,967,1008,1919

ESTIMATED FORMATION TOPS

Formation	Top (TVD)	Base (TVD)	Lithology	Comments
Fresh Water Zone	1	517		FW @ 176,453,517, ...
Maxton	1771	1798	Sandstone	No Coal Seams Identified to Exist
Big Lime	1951	2090	Limestone	SW @ 1156, ,
Weir	2241	2363	Sandstone	Red Rock Bases Possible @ 46,86,182,235,290,396,462,513,580, 643,704,802,864,916,967,1008,1919
Top Devonian	2469			
-Gantz	2469	2489	Silty Sand	
-Fifty foot	2563	2633	Silty Sand	
-Thirty foot	2649	2683	Silty Sand	
-Gordon	2711	2773	Silty Sand	
-Forth Sand	2799	2811	Silty Sand	
-Bayard	2956	2986	Silty Sand	
Int. csg pt	3036			
-Warren	3295	3340	Silty Sand	
-Speechley	3348	3399	Silty Sand	
-Balltown A	3843	3866	Silty Sand	
-Riley	4427	4475	Silty Sand	
-Benson	4763	4794	Silty Sand	
-Alexander	5096	5170	Silty Sand	
-Elks	5170	6203	Gray Shales and Silts	
-Sonyea	6203	6347	Gray shale	
-Middlesex	6347	6398	Shale	
-Genesee	6398	6474	with black shale	
-Geneseo	6474	6509	Black Shale	
-Lateral Zone	**6480**	**6480**		**Start Lateral at 6480 ft, drill to 6480 ft**
-Tully	6509	6522	Limestone	
-Hamilton	6522	6532	calcareous shales	
-Marcellus	6532	6585	Black Shale	
-Purcell	6545	6550	Limestone	
-Cherry Valley	6567	6570	Limestone	
Onondaga	6585		Limestone	

Base RR 1919

Target Thickness	35 feet
Anticipated Target Pressure	2190 PSI

Comments: Note that this is a TVD prog for a horizontal well. **All measurements taken from estimated KB elevation.** Water and coal information estimated from surrounding well data. Intermediate casing point is recommended 50' beneath the Bayard to shut off any water production from the upper Devonian sands. Intermediate casing should be cemented into the surface string, per WV regulations. The estimated TD is the TVD landing point for the horizontal section of well, with the plan to then drill to a final TVD of 6480' at the toe of the lateral. The geologic structure is unknown at this time.

LATERAL DRILLING TOLERANCES

Mapview - Left of borehole: Deviate as little as possible left to avoid planned lateral 513761
Mapview - Right of borehole: Deviate as little as possible right to avoid planned lateral 513759
Mapview - TD: DO NOT EXTEND beyond recommended wellbore to avoid leaseline.

RECOMMENDED CASING POINTS

Fresh Water/Coal	CSG OD	13 3/8	CSG DEPTH:	1055
Intermediate 1:	CSG OD	9 5/8	CSG DEPTH:	3036
Production:	CSG OD	5 1/2	CSG DEPTH:	@ TD

J. Dereume/ E. Glick	Author	Date Created	Plat Date
Prog created:	EVG	6/2/2014	5/27/2014
length revised	EVG	9/2/2014	8/22/2014
Changed target formation	JMD	12/3/2014	12/2/2014
Changed landing and bottom hole	JMD	12/8/2014	12/2/2014
shortened lateral	EVG	12/16/2014	12/5/2014

SSP Prog 2 6A

05/22/2015

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MOD 2

Section VII: Collision Avoidance

Collision avoidance is managed by utilizing gyro tools, downhole steering tools (MWD/EM), and anti-collision software by engineers. Two drilling scenarios that occur are normal pad drilling and return to pad drilling. EQT categorizes these two scenarios as such because the two scenarios utilize very different mitigation plans.

Normal pad drilling is defined when a top hole rig drills each well on the pad down to kick off point (KOP) and then a bottom hole rig moves onto the pad after the top-hole rig moves off and drills the curve and lateral sections. Normal pad drilling can also be defined when a bottom hole rig moves to a pad and drills each well on the pad from surface to TD (Grassroots Well). Normal pad drilling carries much less risk and thus does not require frequent surveying and collision avoidance maneuvers because no producing wells are present and risk of unexpected pressure or well control events are not present.

Return to pad drilling is a scenario where a top-hole rig or a bottom hole rigs returns to a pad to drill additional well(s) that currently have producing (live) wells on the pad. Return to pad drilling requires more frequent surveying and anti-collision avoidance management because producing wells are present. By utilizing good engineering well design, anti-collision software and frequent surveys, wells can safely be drilled while existing or producing wells exist on the pad.

With both normal and return to pad drilling operations, every well planned to be drilled has a surface plot diagram, 2-D plot diagram, and a pad plot diagram prepared. (Plots attached under "Collision Avoidance Diagrams") In each scenario, north seeking gyro tools, MWD/EM tools, and anti-collision processes are utilized to mitigate the risk of downhole collisions. Anti-collision processes include conformation of gyro accuracy, evaluation of anti-collision software (Compass or equivalent program), and 2-D/3-D model plotting. In both scenarios, it is EQT's standard operating procedure (SOP) for the on-site supervisor of EQT and the directional drilling company supervisor to confirm the orientation of the directional tools and ensure that the tools are orientated consistent with the directional motor's high side. When anti-collision is a risk and directional assemblies are required to navigate utilizing a gyro tool, it is EQT's SOP to use the Gyro company's muleshoe to ensure the accuracy of the gyro seat in the muleshoe. In addition, when using this muleshoe, it is EQT's SOP to have the EQT's on-site supervisor, directional drilling company supervisor, and gyro company supervisor confirm the alignment and orientation of the tool and ensure that the tools are orientated consistent with the directional motor's high side. This ensures the azimuthal direction is correct when steering the well.

Normal Pad Drilling

In this scenario, there are no existing wells on the pad. A top-hole rig will move on to the pad and drill each well to KOP and then a bottom hole rig will move on after the top hole rig finishes and drill the each well to horizontal TD. At times, the bottom hole rig may drill each well from surface to horizontal TD.

During this scenario, if two wells come within 10 feet or a separation factor of 1.5, each survey is monitored closely and anti-collision is run after each survey until the wells are clear of a collision risk. If a SF ≤ 1.0 or ≤ 5' separation is encountered or a collision occurs, an email notification will be sent by the EQT on-site drilling supervisor to the appropriate state inspector. In the event the proximity of wells get

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MOD 2

to a point where a collision cannot be avoided or a collision occurs, EQT will properly secure each well and evaluate the most prudent plan forward while communicating plans with the state inspector.

Vertical Section:

Each hole is drilled to KOP by either the top-hole rig or bottom hole rig. Once KOP is achieved then a gyro survey is run. No nudges are planned.

- Each gyro is analyzed and certified accurate by the gyro company before it is used for any directional planning or modeling. Each tool is roll tested on location and if all surveys are within tolerances the gyro survey is sent to the gyro company's office to be further analyzed and certified accurate.

Horizontal Section:

After the top-hole section of the well is complete and the well is at KOP, anti-collision is run on each well and the most efficient well path with the lowest risk of collision is selected by engineers. Directional bottom hole assemblies (BHA) are run in the hole and used to drill the well from vertical to horizontal. Gyros or MWD/EM surveys are taken as needed to steer the well until the well is away from the other wells and the risk of collision is eliminated. Surveys utilizing MWD/EM tools are taken from that point on to the total depth of the well is achieved. After each survey is taken, the surveys are analyzed by both EQT engineers and the directional drilling well planning technicians and anti-collision is run to ensure current well path is not in the direction of a producing well(s) and consistant with the permitted well path.

- Anti-Collision is a software program into which gyro surveys or MWD/EM surveys are uploaded. The software runs 2-D and 3-D well paths of all wells within the vicinity of the well being drilled.
- Surveys are taken every 100'.
- While directionally drilling the well, anti-collision software is constantly updated and separation factors (SF) are analyzed.
- Each survey is analyzed and certified accurate by the directional company before it is used for any directional planning or modeling.

Return to Pad Drilling

In this scenario a top-hole rig or bottom hole rig will move on a pad that currently has producing (live) wells on the pad. Prior to drilling additional wells on the pad, the gyro from the existing wells on the pad are analyzed by engineers to evaluate how the existing wells walk in the vertical part of the well. Then preliminary directional plans are prepared to mitigate downhole collisions. EQT plans to drill and develop the pad while producing existing offset wells. However, additional well path management (more frequent surveying and anti-collision modeling) is performed by engineers during the drilling process both in the vertical and horizontal sections of each well.

During this scenario, the well is surveyed from surface to TD as it is drilled and if two wells come within 14 feet or a SF of 2.0, each survey is monitored closely and anti-collision is run after each survey until the wells are clear of a potential collision. If a SF ≤ 1.0 or ≤ 5' separation is encountered, an email notification will be sent by the EQT on-site drilling supervisor to the

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Mod 2

appropriate state inspector. In the event the proximity of wells get to a point where a collision cannot be avoided, EQT will properly secure each well and evaluate the most prudent plan forward while communicating plans with the state inspector.

Vertical Section:

After the rig moves on the pad and starts drilling, gyro surveys are taken several times from surface to KOP. After each gyro is taken, the surveys are analyzed by both EQT engineers and the directional drilling well planning technicians and anti-collision is run to ensure current well path is not in the direction of a producing well(s). All of these steps are completed prior to the resumption of drilling. Actual frequency of gyros is determined by engineers and the position of the hole as it relates to existing wells on the pad. No nudges are planned.

- Anti-Collision is a software program into which gyro surveys or MWD/EM surveys are uploaded. The software runs 2-D and 3-D well paths of all wells within the vicinity of the well being drilled.
- While vertically drilling the well, anti-collision software is constantly updated and separation factors (SF) are analyzed.
- Each gyro is analyzed and certified accurate by the gyro company before it is used for any directional planning or modeling. Each tool is roll tested on location and if all surveys are within tolerances the gyro survey is sent to the gyro company's office to be further analyzed and certified accurate.

Horizontal Section:

Directional BHAs are run in the hole and used to drill the well from vertical to horizontal. Gyros or MWD/EM surveys are taken as needed to steer the well until the well is away from the other wells and the risk of collision is eliminated. Surveys utilizing MWD/EM tools are taken continuously until the total depth of the well is achieved. After each survey is taken, the surveys are analyzed by both EQT engineers and the directional drilling well planning technicians and anti-collision is run to ensure current well path is not in the direction of a producing well(s) and consistent with the permitted well path.

- Anti-Collision is a software program into which gyro surveys or MWD/EM surveys are uploaded. The software runs 2-D and 3-D well paths of all wells within the vicinity of the well being drilled.
- Surveys are taken every 100'.
- While directionally drilling the well, anti-collision software is constantly updated and separation factors (SF) are analyzed.
- Each survey is analyzed and certified accurate by the directional company before it is used for any directional planning or modeling.

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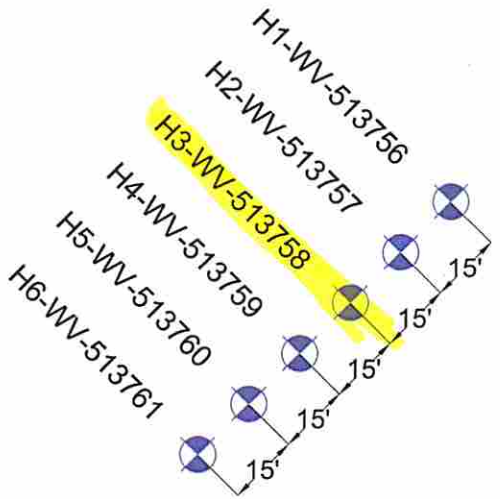
05/22/2015



WELL NUMBER	API NUMBER	STATUS
513756	47-8510132	TOPSET - NOT LIVE
513757	47-8510133	TOPSET - NOT LIVE
513758	47-8510134	TOPSET - NOT LIVE
513759	47-8510135	TOPSET - NOT LIVE
513760	47-8510136	TOPSET - NOT LIVE
513761	47-8510137	TOPSET - NOT LIVE

REVISION SUMMARY	
1	-
-	-
-	-
-	-

	BY	DATE
DRAWN	-	4-16-2015
CHECKED	-	-
APPROVED	-	-
APPROVED	-	-

EQT Production

OXF163 Well Spacing and Status

DWG NO:

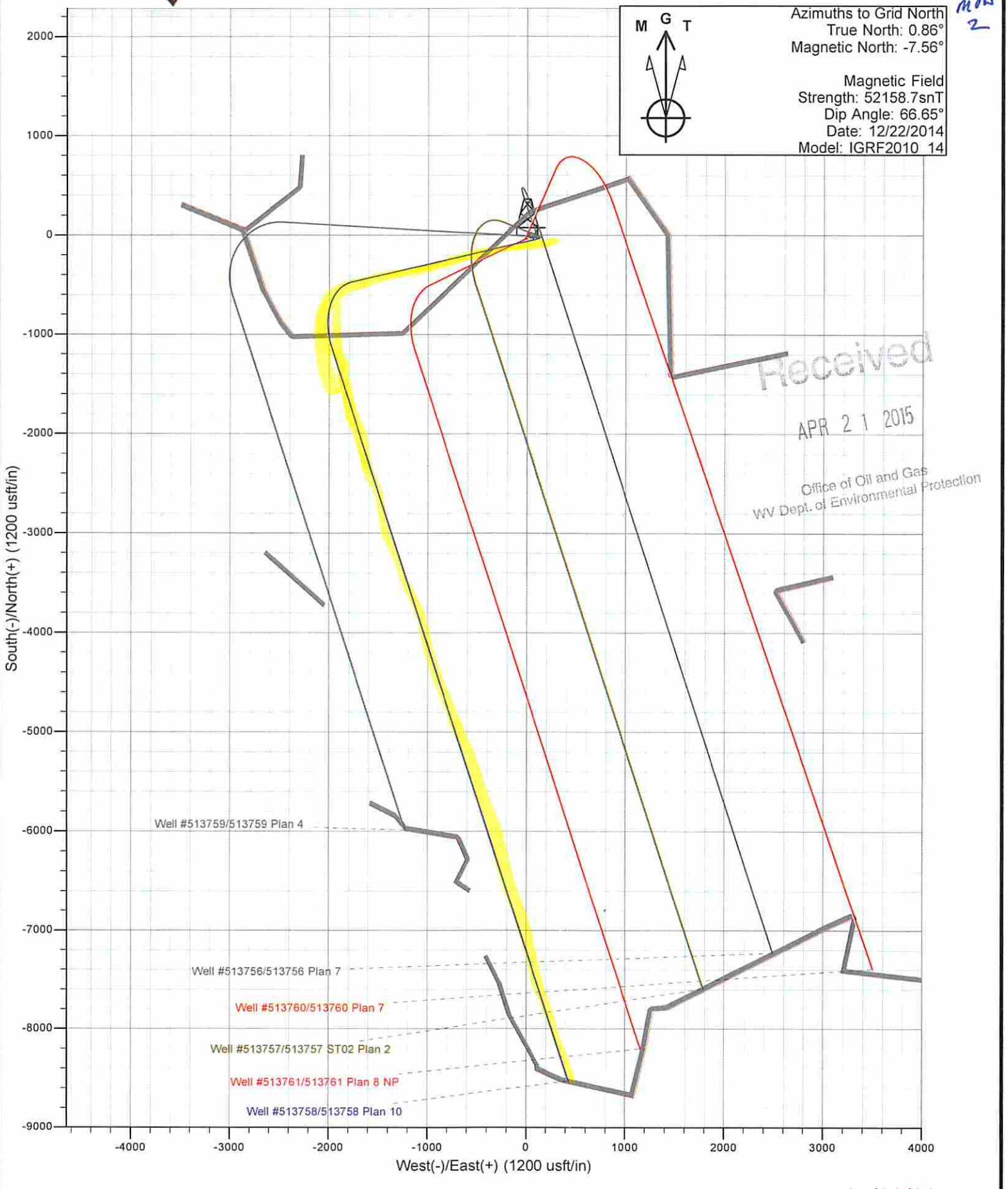
PAGE: 1 OF 1

REV: 0

PHOENIX
TECHNOLOGY SERVICES

EQT Production - Geneseo Shale

085-10134
MOD 2



05/22/2015

FORM WW 6

ROYALTY OWNERS		
CRAIG H. WILLIAMS	243.83 AC.±	LEASE NO. 987447
J.P. SMITH ET UX	130 AC.±	LEASE NO. 107857
DONALD SHEETS ET AL	82.10 AC.±	LEASE NO. 988339

EQT PRODUCTION COMPANY
J.E. PIERCE ET AL LEASE
108 (98.73±) ACRES±
WELL NO. WV 513758

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)

NAD'27 S.P.C.(FT)	N. 234,477.3	E. 1,619,107.1
NAD'27 GEO.	LAT-(N) 39.135962	LONG-(W) 80.842816
NAD'83 UTM (M)	N. 4,331,885.9	E. 513,599.6
LANDING POINT		
NAD'27 S.P.C.(FT)	N. 232,817.3	E. 1,617,298.2
NAD'27 GEO.	LAT-(N) 39.131331	LONG-(W) 80.849105
NAD'83 UTM (M)	N. 4,331,371.0	E. 513,057.0
BOTTOM HOLE		
NAD'27 S.P.C.(FT)	N. 225,950.7	E. 1,619,529.3
NAD'27 GEO.	LAT-(N) 39.112571	LONG-(W) 80.840879
NAD'83 UTM (M)	N. 4,329,290.5	E. 513,771.6

LATITUDE 39°10'00"

LONGITUDE 80°50'00"

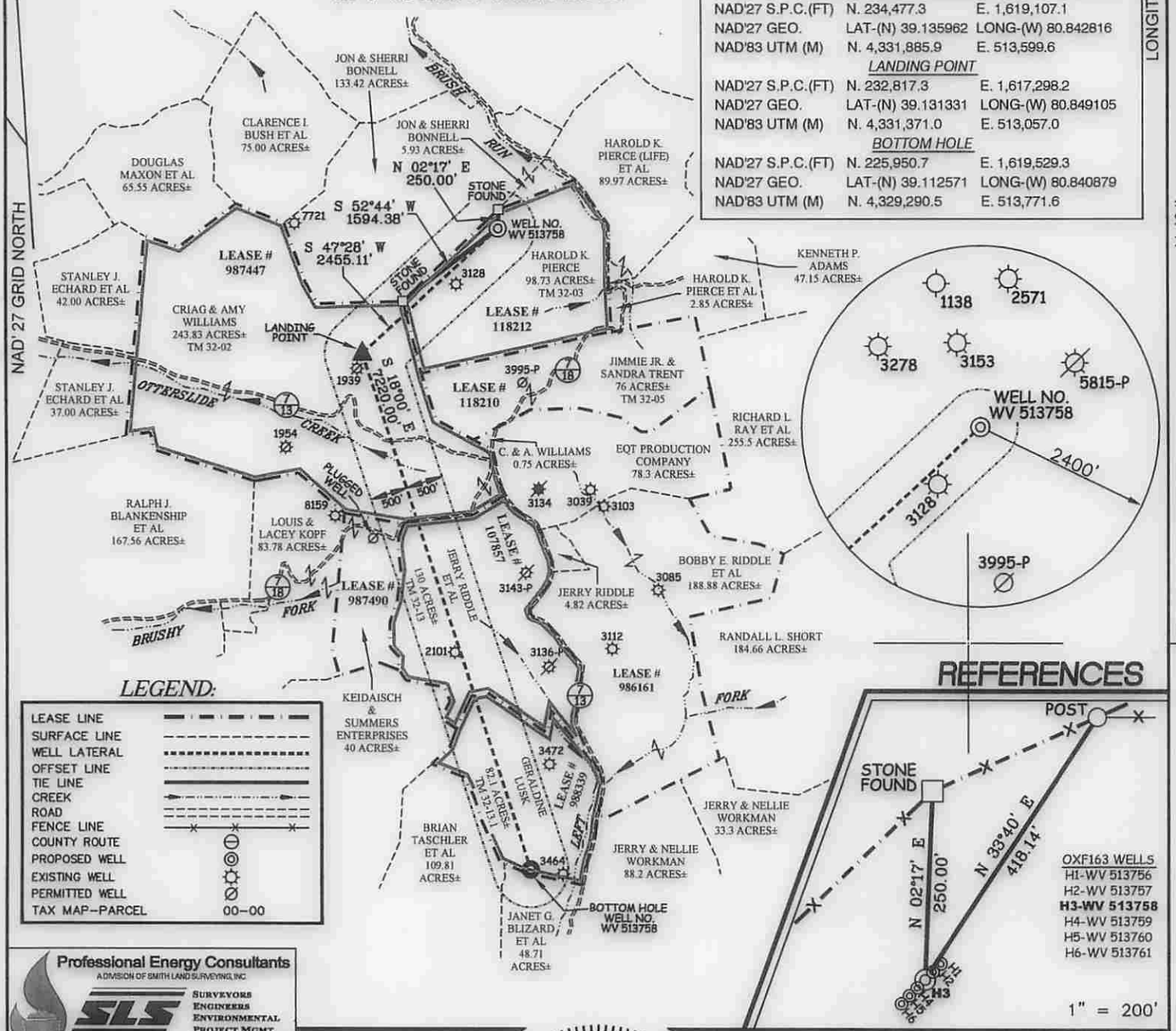
2,690'

11,184'

NAD' 27 GRID NORTH

NOTES ON SURVEY

1. NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS ≥ 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.



LEGEND:

LEASE LINE
SURFACE LINE
WELL LATERAL
OFFSET LINE
TIE LINE
CREEK
ROAD
FENCE LINE
COUNTY ROUTE
PROPOSED WELL
EXISTING WELL
PERMITTED WELL
TAX MAP--PARCEL 00-00

REFERENCES

OXF163 WELLS
H1-WV 513756
H2-WV 513757
H3-WV 513758
H4-WV 513759
H5-WV 513760
H6-WV 513761

1" = 200'

Professional Energy Consultants
A DIVISION OF SMITH LAND SURVEYING, INC.
SLS
SURVEYORS ENGINEERS ENVIRONMENTAL PROJECT MGMT.
(304) 462-5634 WWW.SLSSURVEYS.COM

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 DIVISION OF ENVIRONMENTAL PROTECTION.

P.S. 849 C. Victor Moyers

C. VICTOR MOYERS LICENSED No. 849 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

DATE MAY 27 , 20 14

REVISED 08/22/14, 10/27/14, 10/31/14, 12/02/14, 12/05/14 & 04/14/15

OPERATORS WELL NO. WV 513758

API WELL NO. 47 — 085 — 10134 MOD2
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500

FILE NO. 7698P513758R7

SCALE 1" = 2000'

HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK)

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

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___ IF "GAS" PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X

LOCATION :

ELEVATION 1,175(GROUND)1,158.5'(PROPOSED) WATERSHED BRUSH RUN OF MIDDLE FORK

DISTRICT UNION COUNTY RITCHIE QUADRANGLE OXFORD 7.5'

SURFACE OWNER HAROLD K. PIERCE ACREAGE 98.73±

ROYALTY OWNER J.E. PIERCE ET AL ACREAGE 108± (98.73±)

PROPOSED WORK : LEASE NO. 118212

DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION ___ PLUG AND ABANDON ___ CLEAN OUT AND REPLUG ___ OTHER ___

PHYSICAL CHANGE IN WELL (SPECIFY) ___ TARGET FORMATION GENESEO

ESTIMATED DEPTH TVD 6434'

05/22/2015

COUNTY NAME

PERMIT

WELL OPERATOR EQT PRODUCTION COMPANY **DESIGNATED AGENT** REX C. RAY

ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330 **ADDRESS** 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330

SLS

4708510134

WW-6A1
(5/13)

Operator's Well No. 513758

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
✓ Lease 118212			min pd 1/8th	
	J. E. Pierce, L. L. Pierce & Felsie Pierce	Pittsburgh & WV Gas. Co.		LB 45/257
	Pittsburg & WV Gas Co.	Equitable Gas Company		DB 126/473
	Equitable Gas Company	Equitrans, Inc.		LB 201/253
	Equittrans, Inc.	Equitable Production Company		LB 192/19
	Equitable Production Company	EQT Production Co		DB 281/346
✓ Lease 987447			min pd 1/8th	
	Craig H. Willams & Amy L. Willams	EQT Production Co		DB 370/952
✓ Lease 107857			min pd 1/8th	
	Beatty Jean Nutter	EQT Production Co		LB 255/510
	Jerry Allen Riddle	EQT Production Co		LB 255/516
✓ Lease 988339			min pd 1/8th	
	Whittle Corporation	Antero Resources Corp.		LB254/1024
	Antero Resources Corp.	EQT Production Co.		LB273/865

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.

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:

Its: Permitting Supervisor