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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

Earl Ray Tomblin, Governor  
Randy C. Huffman, 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 514464  
47-095-02256-00-00

Extend Lateral

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: 514464  
Farm Name: WELLS, VIVIAN J.  
U.S. WELL NUMBER: 47-095-02256-00-00  
Horizontal 6A / Horizontal 6A Well - 1  
Date Issued: 1/10/2017

Promoting a healthy environment.

01/20/2017



November 15, 2016

James Martin  
WV Dept. of Environmental Protection  
Division of Oil and Gas  
601 57<sup>th</sup> St East  
Charleston, WV 25304

RE: Permit Modifications – API#s: 47-095-02257; 47-095-02264; 47-095-02256

Dear Mr. Martin

Please find attached modified WW-6Bs, WW-6A1s and plats for the above listed APIs due to lengthening of the wellbores.

If you have any questions, please contact me at 304.848.0076

Sincerely,

A handwritten signature in black ink that reads "Vicki Roark" followed by a circled "RS" in the upper right corner.

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 Tyler Weston Shirley  
Operator ID County District Quadrangle

2) Operator's Well Number: 514464 Well Pad Name: SHR60

3) Farm Name/Surface Owner: Vivian J Wells et al Public Road Access: 60/2

4) Elevation, current ground: 1011 Elevation, proposed post-construction: 1011

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, 6596', 52', 2747 PSI

8) Proposed Total Vertical Depth: 6596

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 19092

11) Proposed Horizontal Leg Length: 11767

12) Approximate Fresh Water Strata Depths: 83,133,570,906

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

14) Approximate Saltwater Depths: 1198,1865

15) Approximate Coal Seam Depths: 19,420,686,875,1315

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**

| <b>TYPE</b>  | <b>Size (in)</b> | <b>New or Used</b> | <b>Grade</b> | <b>Weight per ft. (lb/ft)</b> | <b>FOOTAGE: For Drilling (ft)</b> | <b>INTERVALS: Left in Well (ft)</b>                               | <b>CEMENT: Fill-up (Cu. Ft.)/CTS</b> |
|--------------|------------------|--------------------|--------------|-------------------------------|-----------------------------------|---|--------------------------------------|
| Conductor    | 20               | New                | A-500        | 78.6                          | 60                                | 60  | 90 ft <sup>3</sup> / CTS             |
| Fresh Water  | 13 3/8           | New                | J-55         | 54.5                          | 1006                              | 1006  | 1048 ft <sup>3</sup> / CTS           |
| Coal         |                  |                    |              |                               |                                   |   |                                      |
| Intermediate | 9 5/8            | New                | A-500        | 40                            | 2788                              | 2788  | 1234 ft <sup>3</sup> / CTS           |
| Production   | 5 1/2            | New                | P-110        | 20                            | 19092                             | 19092   | 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       |                  |                    |              |                               |                                   |   |                                      |

| <b>TYPE</b>  | <b>Size (in)</b> | <b>Wellbore Diameter (in)</b> | <b>Wall Thickness (in)</b> | <b>Burst Pressure (psi)</b> | <b>Anticipated Max. Internal Pressure (psi)</b> | <b>Cement Type</b> | <b>Cement Yield (cu. ft./k)</b> |
|--------------|------------------|-------------------------------|----------------------------|-----------------------------|---|--------------------|---------------------------------|
| Conductor    | 20               | 26                            | .375                       | 1378                        | 1102  | Class A            | 1.18                            |
| Fresh Water  | 13 3/8           | 17 1/2                        | .38                        | 2700                        | 2160  | See Variance       | 1.2                             |
| Coal         |                  |                               |                            |                             |   |                    |                                 |
| Intermediate | 9 5/8            | 12 3/8                        | .395                       | 3950                        | 3160  | See Variance       | 1.25 / 1.19                     |
| Production   | 5 1/2            | 8 1/2                         | .361                       | 12640                       | 10112   | Class H            | 1.123/2.098                     |
| 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 5195'. 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 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.

**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 attached

**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 *Victoria Roark* (PS)  
 By: Victoria J. Roark  
 Its: Permitting Supervisor

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| Lease No. | Grantor, Lessor, etc.  | Grantee, Lessee, etc.                     | Royalty | Book/Page   |  |
|-----------|--|---|---------|-------------|--|
| / 126101  | <b>George Birklein, et al (current royalty owner)</b>            |   | **      |             |  |
|           | WM. Blaine Underwood Et ux et al (original lessor)               | Equitable Gas Co.                         |         | DB186/86    |  |
|           | Equitable Gas Co.  | Equitrans, Inc.                           |         | DB274/471   |  |
|           | Equitrans, Inc./Equitable Gas Company/Equitable Resour           | Equitrans, L.P.                           |         | DB433/777   |  |
|           | Equitrans, L.P.  | EQT Production Company                    |         | DB396/640   |  |
|           | Equitrans, L.P.  | EQT Production Company                    |         | OG420/10    |  |
| 5-18-7.1  | Brenda J. Ashley, et al  | EQT Production Company                    |         | 508/181     |  |
| 5-18-7.1  | Patricia A. Keys   | EQT Production Company                    |         | 514/375     |  |
|           |  |   |         | Subsurface  |  |
|           |  |   |         | Subsurface  |  |
| / 126164  | <b>Stephen Seckman, et al (current royalty owner)</b>            |   | **      |             |  |
|           | Retha Seckman, et al   | Equitable Gas Co.                         |         | DB192/351   |  |
|           | Equitable Gas Co.  | Equitrans, Inc.                           |         | DB274/471   |  |
|           | Equitrans, Inc./Equitable Gas Company/Equitable Resour           | Equitrans, L.P.                           |         | DB433/777   |  |
|           | Equitrans, LP  | EQT Production Company                    |         | DB396/640   |  |
| / 126124  | <b>Donald Bible, et al (current royalty owner)</b>               |   | **      |             |  |
|           | Clyde Stewart, et ux   | Equitable Gas Co.                         |         | LB191/165   |  |
|           | Equitable Gas Co.  | Equitrans, Inc.                           |         | DB274/471   |  |
|           | Equitrans, Inc./Equitable Gas Company/Equitable Resour           | Equitrans, L.P.                           |         | DB433/777   |  |
|           | Equitrans, L.P.  | EQT Production Company                    |         | DB396/640   |  |
| / 126167  | <b>Berdina Rose, et al (current royalty owner)</b>               |   | **      |             |  |
|           | Savannah Pratt, et al (original lessor)                          | Equitable Gas Co.                         |         | DB192/425   |  |
|           | Equitable Gas Co.  | Equitrans, Inc.                           |         | DB274/471   |  |
|           | Equitrans, Inc./Equitable Gas Company/Equitable Resour           | Equitrans, L.P.                           |         | DB433/777   |  |
|           | Equitrans, L.P.  | EQT Production Company                    |         | DB396/640   |  |
| / 126211  | <b>Below the Fifth Sand</b>                                      |   | **      |             |  |
|           | <b>John A. Dillon, et al (current royalty owner)</b>             |   | **      |             |  |
|           | Mary E. Underwood, et vir (original lessor)                      | Hope Natural Gas Co.                      |         | DB70/477    |  |
|           | Hope Natural Gas Co.   | Consolidated Gas Supply Corp.             |         | DB169/26    |  |
|           | Consolidated Gas Supply Corp.                                    | Consolidated Gas Transmission Corp.       |         | DB249/287   |  |
|           | Consolidated Gas Transmission Corp.                              | CNG Development Co.                       |         | DB253/57    |  |
|           | CNG Development Co.  | Dominion Appalachian Development, Inc.    |         | DB337/340   |  |
|           | Dominion Appalachian Development, Inc.                           | Consol Gas Appalachian Development, LLC   |         | CB9/131     |  |
|           | Consol Gas Appalachian Development, LLC                          | CNX Gas Co., LLC                          |         | CB9/206     |  |
|           | CNX Gas Co., LLC   | EQT Production Co.                        |         | DB479/55    |  |
|           | CNX Gas Co., LLC/Noble Energy, Inc                               | EQT Production Co.                        |         | AB505/222   |  |
|           |  |   |         | name change |  |
|           |  |   |         | name change |  |
| / 190034  | <b>Paul Weekley (current royalty owner)</b>                      |   | **      |             |  |
|           | Paul Weekley, et al (original lessor)                            | EQT Production Co.                        |         | DB548/119   |  |
| / 126186  | <b>Bruce L. Stoneking, et al (current royalty owner)</b>         |   | **      |             |  |
|           | Addie Keys & Paul Weekley (original lessor)                      | Equitable Gas Company                     |         | DB195/372   |  |
|           | Equitable Gas Co.  | Equitrans, Inc.                           |         | DB274/471   |  |
|           | Equitrans, Inc./Equitable Gas Company/Equitable Resour           | Equitrans, L.P.                           |         | DB433/777   |  |
|           | Equitrans, L.P.  | EQT Production Company                    |         | DB396/640   |  |
| / 126268  | <b>Logan Hassig, et al (current royalty owner)</b>               |   | **      |             |  |
|           | Logan Hassig, et ux (original lessor)                            | Equitable Gas Company                     |         | 205/119     |  |
|           | Equitable Gas Co.  | Equitrans, Inc.                           |         | DB274/471   |  |
|           | Equitrans, Inc./Equitable Gas Company/Equitable Resou            | Equitrans, L.P.                           |         | DB433/777   |  |
|           | Equitrans, L.P.  | Equitable Production Company              |         | DB396/640   |  |
| / 126133  | <b>Dorothy H. Bode (current royalty owner)</b>                   |   | **      |             |  |
|           | Mollie Scott (original lessor)                                   | Equitable Gas Company                     |         | DB191/417   |  |
|           | Equitable Gas Co.  | Equitrans, Inc.                           |         | DB274/471   |  |
|           | Equitrans, Inc./Equitable Gas Company/Equitable Resou            | Equitrans, L.P.                           |         | DB433/777   |  |
|           | Equitrans, L.P.  | EQT Production Company                    |         | DB396/640   |  |
| / 105456  | <b>Kimberly Wilcox (current royalty owner)</b>                   |   | **      |             |  |
|           | Olve I. Stewart, et vir (original lessor)                        | J L Newman                                |         | LB69/42     |  |
|           | J. L. Newman   | The Philadelphia Company of West Virginia |         | OG455/390   |  |
|           | The Philadelphia Company of West Virginia                        | Pittsburgh and West Virginia Gas Company  |         | DB101/36    |  |
|           | Pittsburgh and West Virginia Gas Company                         | Equitable Gas Co.                         |         | 132/414     |  |
|           | Equitable Gas Co.  | Equitrans, Inc.                           |         | DB274/471   |  |
|           | Equitrans, Inc./Equitable Gas Company/Equitable Resou            | Equitrans, L.P.                           |         | DB433/777   |  |
|           | Equitrans, L.P.  | EQT Production Company                    |         | DB396/640   |  |
|           |  |   |         |             |  |
|           |  |   |         |             |  |
| / 126138  | <b>Sandra Lee Freeman-Carrazo, et al (current royalty owner)</b> |   | **      |             |  |
|           | E.K. Freeman, Et ux (original lessor)                            | Equitable Gas Company                     |         | 224/463     |  |
|           | Equitable Gas Co.  | Equitrans, Inc.                           |         | DB274/471   |  |
|           | Equitrans, Inc.  | Equitrans, L.P.                           |         | DB433/777   |  |
|           | Equitrans, L.P.  | EQT Production Company                    |         | DB396/640   |  |
| / 126237  | <b>Brenda Jane Becker, et al (current royalty owner)</b>         |   | **      |             |  |
|           | India Davis, et al (original lessor)                             | Equitable Gas Company                     |         | 200/341     |  |
|           | Equitable Gas Co.  | Equitrans, Inc.                           |         | DB274/471   |  |
|           | Equitrans, Inc.  | Equitrans, L.P.                           |         | DB433/777   |  |
|           | Equitrans, L.P.  | EQT Production Company                    |         | DB396/640   |  |

\*\*We certify that we will pay a minimum of 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 and 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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NOV 17 2016

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4709502256

November 7, 2016

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

Re: SHR60, 47-095-02257, 02256, 02264  
McElroy District, Tyler 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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514464

**WEST VIRGINIA GEOLOGICAL PROGNOSIS**

Horizontal Well  
514464 (SHR60H5)

**Drilling Objectives:** Marcellus  
**County:** Tyler  
**Quad:** Shirley  
**Elevation:** 1024 KB 1011 GL, as built  
**Surface location** Northing: 328522.18 Easting: 1629439.25  
**Landing Point** Northing: 327694.99 Easting: 1628675.02  
**Toe location** Northing: 316863.77 Easting: 1633272.60  
**Recommended Azimuth** 157 Degrees **TVD: 6596**  
**Recommended LP to TD: 11,767'**

**Proposed Logging Suite:** Formation tops based on pilot hole logs from SHR60 well 514460 (deep) and 514463 (intermediate).  
**An elog should be run for the first well on every horizontal well pad.**  
 Geologist to recommend when Mudloggers need to be on location 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.

**ESTIMATED FORMATION TOPS**

| Formation        | Top (TVD) | Base (TVD) | Lithology             | Comments  | Top RR | Base RR          |
|------------------|-----------|------------|-----------------------|---|--------|------------------|
| Fresh Water Zone | 1         | 906        |                       | FW @ 83,133,570,906, .  | 23     | 559              |
| Coal             | 19        | 23         | Coal                  |   | 57     | 67               |
| Coal             | 420       | 424        | Coal                  | No past, present, or planned mining   | 326    | 345              |
| Coal             | 686       | 690        | Coal                  |   | 391    | 402              |
| Coal             | 875       | 879        | Coal                  |   | 425    | 665              |
| Coal             | 1315      | 1319       | Coal                  |   | 533    | 990              |
| Maxton           | 1534      | 1587       | Sandstone             | SW @ 1198,1865, .   | 686    | 701              |
| Big Lime         | 1829      | 2111       | Limestone             |   | 741    | 752              |
| Weir             | 2251      | 2317       | Sandstone             |   | 780    | 833              |
| Top Devonian     | 2368      |            |                       | Storage is NOT of concern. Pad is located 350' outside of the Shirley storage field protective boundary | 836    | 845              |
| Gantz            | 2368      | 2415       | Silty Sand            |   | 907    | 937              |
| Fifty foot       | 2461      | 1496       | Silty Sand            |   | 968    | 972              |
| Thirty foot      | 2595      | 2636       | Silty Sand            |   | 1285   | 1315             |
| Gordon           | 2686      | 2700       | Silty Sand            |   | 1833   | 1876 Base of Red |
| Int. csg pt      | 2788      |            |                       |   |        |                  |
| Fifth Sand       | 2891      | 2920       | Silty Sand            |   |        |                  |
| Bayard           | 3007      | 3067       | Silty Sand            |   |        |                  |
| Warren           | 3339      | 3413       | Silty Sand            |   |        |                  |
| Speechley        | 3433      | 3551       | Silty Sand            |   |        |                  |
| Balltown A       | 3855      | 3925       | Silty Sand            |   |        |                  |
| Riley            | 4548      | 4585       | Silty Sand            |   |        |                  |
| Benson           | 4965      | 5002       | Silty Sand            | Base of Offset Well Perforations at 5027' TVD   |        |                  |
| Alexander        | 5222      | 5294       | Silty Sand            |   |        |                  |
| Elks             | 5294      | 6212       | Gray Shales and Silts |   |        |                  |
| Sonyea           | 6212      | 6381       | Gray shale            |   |        |                  |
| Middlesex        | 6381      | 6425       | Shale                 |   |        |                  |
| Genesee          | 6425      | 6501       | with black shale      |   |        |                  |
| Genesee          | 6501      | 6530       | Black Shale           |   |        |                  |
| Tully            | 6530      | 6554       | Limestone             |   |        |                  |
| Hamilton         | 6554      | 6571       | calcareous shales     |   |        |                  |
| Marcellus        | 6571      | 6623       | Black Shale           |   |        |                  |
| Purcell          | 6580      | 6589       | Limestone             | Start Lateral at 6596'  |        |                  |
| -Lateral Zone    | 6596      |            |                       |   |        |                  |
| Cherry Valley    | 6606      | 6614       | Limestone             |   |        |                  |
| Onondaga         | 6623      |            | Limestone             |   |        |                  |

|                               |          |
|-------------------------------|----------|
| Target Thickness              | 52 feet  |
| Max Anticipated Rock Pressure | 2747 PSI |

**Comments:**  
 Note that this is a TVD prog for a horizontal well (azimuth of 157 degrees; target formation = Marcellus). All measurements taken from estimated KB elevation. Water and coal information estimated from surrounding well data.  
 Intermediate casing point is recommended 50' beneath the Gordon 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 landing point TVD is 6596', rig geologist may adjust landing point. After the well is landed, drill to reported bed dips/ geologists' recommendation. The geologic structure is unknown at this time.

**LATERAL DRILLING TOLERANCES**

**Mapview - Lateral:** Deviate as little as possible to the left or right of the planned wellbore.  
**Mapview - TD:** **DO NOT EXTEND** beyond recommended wellbore to avoid lease line.

**RECOMMENDED CASING POINTS**

|                         |        |        |            |      |                          |
|-------------------------|--------|--------|------------|------|--------------------------|
| <b>Fresh Water/Coal</b> | CSG OD | 13 3/8 | CSG DEPTH: | 1006 | 86' below the freshwater |
| <b>Intermediate 1:</b>  | CSG OD | 9 5/8  | CSG DEPTH: | 2788 | below the Gordon         |
| <b>Production:</b>      | CSG OD | 5 1/2  | CSG DEPTH: | @ TD |                          |

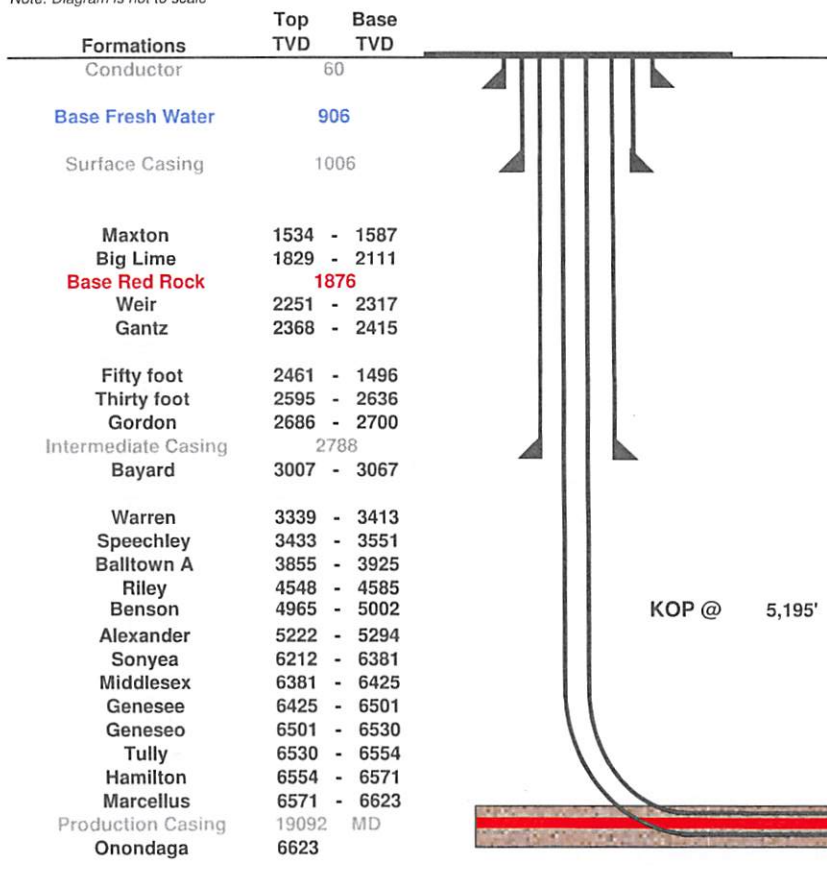
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**Office of Oil & Gas**  
 NOV 17 2016  
 01/20/2017

Well 514464 (SHR60H5)  
 EQT Production  
 Shirley Quad  
 Tyler County, WV

Azimuth 157  
 Vertical Section 12273

Note: Diagram is not to scale

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| Casing and Cementing       |              |                  |                  | Deepest Fresh Water: 906'  |
|----------------------------|--------------|------------------|------------------|--|
| Type                       | Conductor    | Surface          | Intermediate     | Production   |
| Hole Size, In.             | 26           | 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                  | 60'          | 1,006'           | 2,788'           | 19,092'  |
| 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                | A                | H  |
| Cement Yield               | 1.18         | 1.20             | 1.25 / 1.19      | 1.123 / 2.098  |
| Top of Cement (Planned)    | Surface      | Surface          | Surface          | 500' above top Producing Zone  |
| Method                     | Displacement | Displacement     | Displacement     | Displacement   |
| Est. Volume (cu ft)        | 106          | 1,048            | 1,234            | 3,743  |
| Possible Additives         | N/A          | Calcium Chloride | Calcium Chloride | Calcium Carbonate, Fluid Loss, Extender, Dispersent, Viscosifier, Defoamer, POZ, Bonding Agent, Retarder, Anti-Settling/Suspension Agent |

Land curve @ 6,596' TVD 7,326' MD      Est. TD @ 6,596' TVD 19,092' MD

Proposed Well Work:  
 Drill and complete a new horizontal well in the Marcellus formation.  
 Drill the vertical to an approximate depth of 5195'.  
 Kick off and drill curve. Drill lateral in the Marcellus. Cement casing.

11,767' Lateral

Received  
 Office of Oil & Gas  
 NOV 17 2016

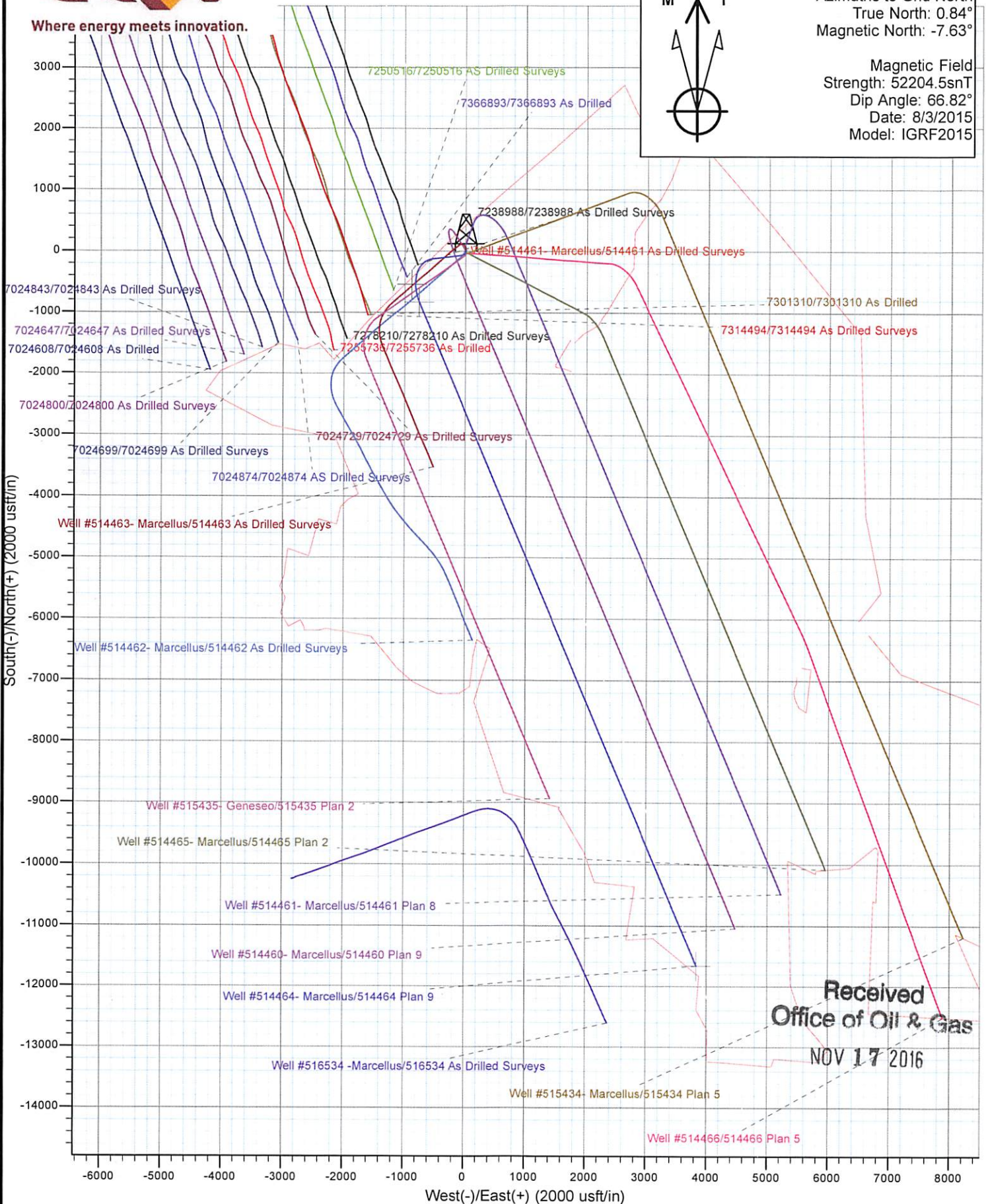




EQT PRODUCTION  
4709502256

Where energy meets innovation.

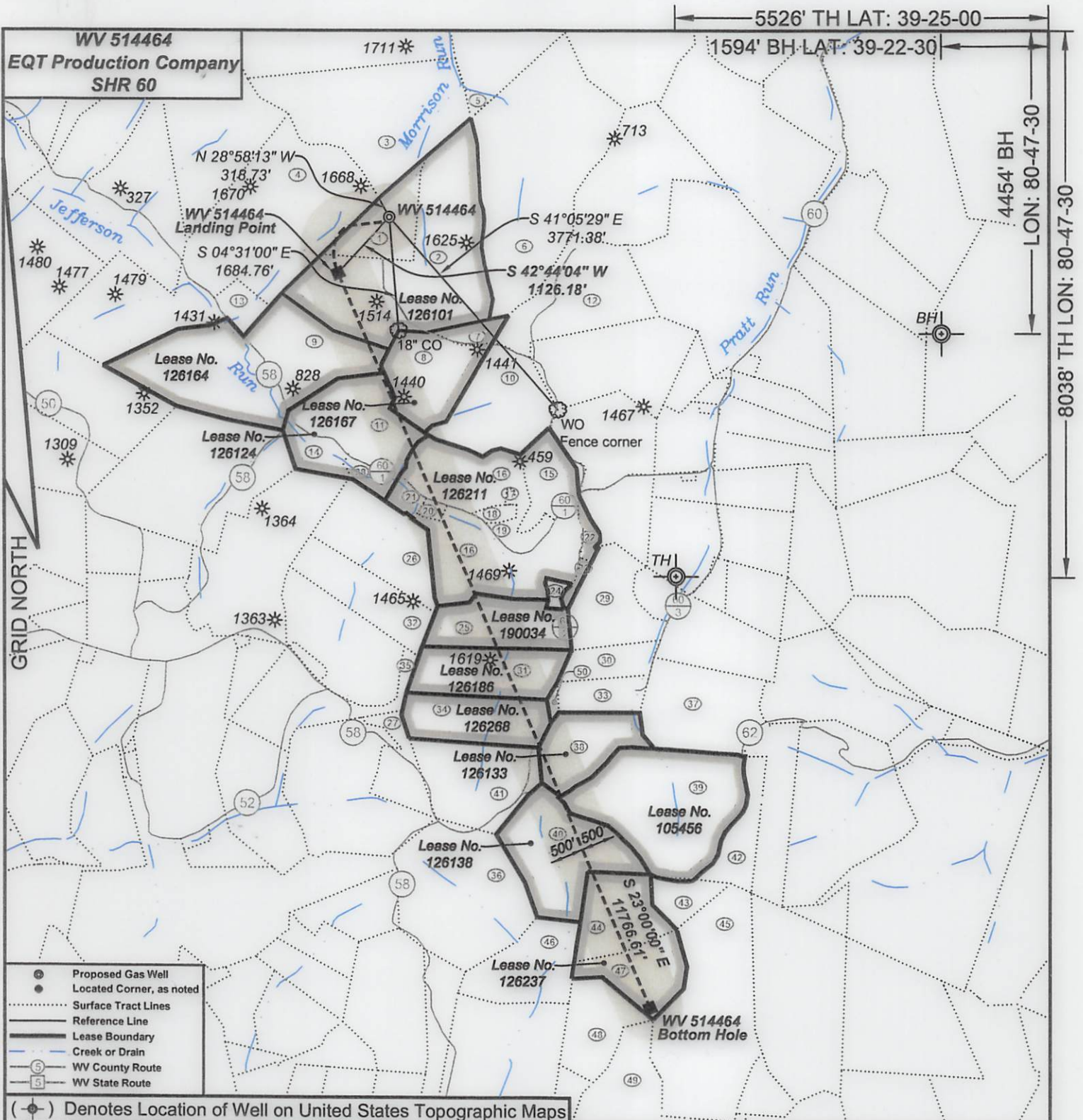
Azimuths to Grid North  
 True North: 0.84°  
 Magnetic North: -7.63°  
 Magnetic Field  
 Strength: 52204.5snT  
 Dip Angle: 66.82°  
 Date: 8/3/2015  
 Model: IGRF2015



Received  
Office of Oil & Gas  
NOV 17 2016

01/20/2017





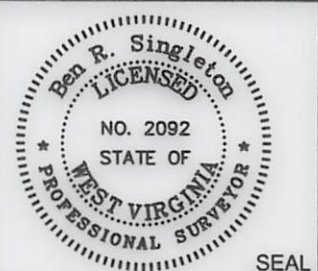
- ⊙ Proposed Gas Well
- Located Corner, as noted
- ⋯ Surface Tract Lines
- Reference Line
- Lease Boundary
- Creek or Drain
- Ⓢ WV County Route
- Ⓟ WV State Route

(⊙) 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.

*Ben R. Singleton*  
P.S. 2092



FILE NO: 208-13  
DRAWING NO: 208-13 SHR 60 H5  
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: October 7 20 16  
OPERATOR'S WELL NO.: WV 514464  
API WELL NO  
47 - 95 - 02256  
STATE COUNTY PERMIT

WELL TYPE:  OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  
(IF GAS) PRODUCTION:  STORAGE  DEEP  SHALLOW  
LOCATION: ELEVATION: As-Built 1,011' WATERSHED Morrison Run of McElroy Creek QUADRANGLE: Shirley  
DISTRICT: McElroy COUNTY: Tyler  
SURFACE OWNER: Vivian J. Wells, et al. ACREAGE: 35.38  
ROYALTY OWNER: George Birklein, et al. LEASE NO: 126101 ACREAGE: 240  
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: 6596

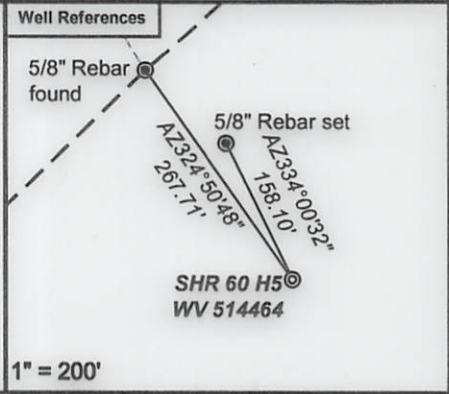
WELL OPERATOR: EQT Production Company DESIGNATED AGENT: Rex C. Ray  
ADDRESS: 115 Professional Place PO Box 280 ADDRESS: 115 Professional Place PO Box 280  
Bridgeport, WV 26330 Bridgeport, WV 26330

01/20/2017



**WV 514464**  
**EQT Production Company**  
**SHR 60**

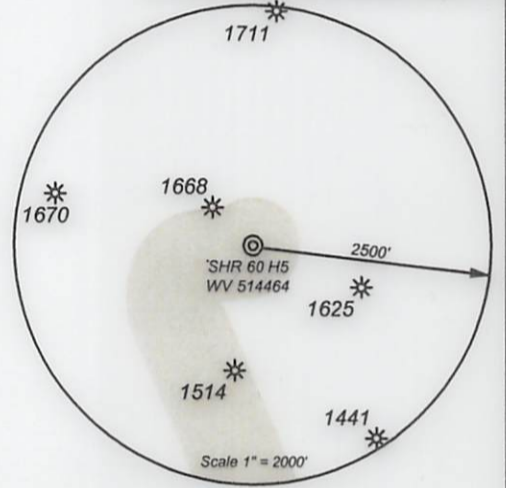
| Tract I.D. | Tax Map No. | Parcel No. | County    | District   | Surface Tract Owner               | Acres  |
|------------|-------------|------------|-----------|------------|-----------------------------------|--------|
| 1          | 18          | 12         | Tyler     | McElroy    | Hanna A. Underwood Estate         | 35.00  |
| 2          | 18          | 13         | Tyler     | McElroy    | Blaine Underwood Estate, et al.   | 104.73 |
| 3          | 18          | 9          | Tyler     | McElroy    | Lawrence Rayburn, et al.          | 100.00 |
| 4          | 18          | 7.1        | Tyler     | McElroy    | Patricia A. Keys, et al.          | 102.31 |
| 5          | 18          | 10         | Tyler     | McElroy    | Susan Spencer                     | 2.92   |
| 6          | 18          | 11         | Tyler     | McElroy    | Susan Spencer                     | 132.00 |
| 7          | 18          | 15         | Tyler     | McElroy    | Susan Spencer                     | 8.00   |
| 8          | 18          | 16         | Tyler     | McElroy    | Donald E. Bible Sr.               | 35.50  |
| 9          | 18          | 23         | Tyler     | McElroy    | Clyde Seckman Estate              | 111.75 |
| 10         | 18          | 17         | Tyler     | McElroy    | Allen Dale Fornash, et al.        | 43.00  |
| 11         | 18          | 22         | Tyler     | McElroy    | Donald E. Bible Sr.               | 39.26  |
| 12         | 18          | 14         | Tyler     | McElroy    | Terry J. Cumberledge, et al.      | 54.81  |
| 13         | 18          | 7          | Tyler     | McElroy    | OK Nan Keys                       | 13.02  |
| 14         | 18          | 22.1       | Tyler     | McElroy    | Barbara Willier                   | 14.00  |
| 15         | 18          | 20.2       | Tyler     | McElroy    | Richard E. Hansen                 | 19.96  |
| 16         | 18          | 20         | Tyler     | McElroy    | Clarence G. Dillon, et al.        | 113.42 |
| 17         | 18          | 20.6       | Tyler     | McElroy    | Clarence G. Dillon Jr.            | 0.71   |
| 18         | 18          | 20.5       | Tyler     | McElroy    | Clarence G. Dillon Jr.            | 2.94   |
| 19         | 18          | 20         | Tyler     | McElroy    | Clarence G. Dillon, et al.        | 113.42 |
| 20         | 18          | 20.4       | Tyler     | McElroy    | John A. Dillon                    | 2.04   |
| 21         | 18          | 20.3       | Tyler     | McElroy    | Peter H. Mueller                  | 4.69   |
| 22         | 18          | 20.1       | Tyler     | McElroy    | William R. Doll Jr, et al.        | 3.06   |
| 23         | 21          | 44         | Tyler     | McElroy    | William R. Doll Jr, et al.        | 2.43   |
| 24         | 21          | 45         | Tyler     | McElroy    | Clarence G. Dillon, et al.        | 2.43   |
| 25         | 21          | 15         | Tyler     | McElroy    | Paul Weekley                      | 36.00  |
| 26         | 21          | 14         | Tyler     | McElroy    | Donnie N. & Kim M. Wilmoth        | 73.39  |
| 27         | 21          | 26         | Tyler     | McElroy    | Peggy A. White                    | 5.00   |
| 28         | 18          | 21         | Tyler     | McElroy    | Barbara Willier                   | 5.90   |
| 29         | 22          | 20         | Tyler     | McElroy    | James B. Scott                    | 30.00  |
| 30         | 21          | 18         | Tyler     | McElroy    | Richard E. & Barbara A. Mullins   | 20.00  |
| 31         | 21          | 16         | Tyler     | McElroy    | Paul Weekley                      | 36.00  |
| 32         | 21          | 14         | Tyler     | McElroy    | Donnie N. & Kim M. Wilmoth        | 73.39  |
| 33         | 21          | 19         | Tyler     | McElroy    | Richard E. & Barbara A. Mullins   | 20.00  |
| 34         | 21          | 17         | Tyler     | McElroy    | Paul Weekley                      | 32.95  |
| 35         | 21          | 27         | Tyler     | McElroy    | Donnie N. & Kim M. Wilmoth        | 7.50   |
| 36         | 21          | 32         | Tyler     | McElroy    | Asia Dell Cumberledge, et al.     | 75.75  |
| 37         | 22          | 19         | Tyler     | McElroy    | Berdina Rose, et al.              | 55.00  |
| 38         | 21          | 21         | Tyler     | McElroy    | James B. Scott                    | 30.00  |
| 39         | 22          | 18         | Tyler     | McElroy    | Bruce W. Boland                   | 86.75  |
| 40         | 21          | 33         | Tyler     | McElroy    | Bruce W. Boland                   | 52.46  |
| 41         | 21          | 23         | Tyler     | McElroy    | Peggy A. White                    | 45.88  |
| 42         | 22          | 18.1       | Tyler     | McElroy    | Bruce W. Boland                   | 18.91  |
| 43         | 22          | 17         | Tyler     | McElroy    | David R. & Elizabeth A. Beveridge | 12.00  |
| 44         | 22          | 16         | Tyler     | McElroy    | Leah Weekley                      | 29.00  |
| 45         | 2           | 18         | Doddridge | West Union | David R. & Elizabeth A. Beveridge | 125.00 |
| 46         | 21          | 34         | Tyler     | McElroy    | Bruce W. Boland                   | 35.43  |
| 47         | 22          | 15         | Tyler     | McElroy    | Isaiah Weekley                    | 25.00  |
| 48         | 2           | 3          | Doddridge | West Union | Isaiah T. Weekley Heirs, et al.   | 27.50  |
| 49         | 2           | 4          | Doddridge | West Union | Robert B. & Marry E. Simpson      | 38.50  |
| 50         | 22          | 20         | Tyler     | McElroy    | James B. Scott                    | 30.00  |



- SHR 60**
- H1, 514460
  - H2, 514461
  - H3, 514462
  - H4, 514463
  - H5, 514464
  - H6, 514465
  - H7, 514466
  - H8, 515434
  - H9, 515435
  - H10, 515436
  - H11, 515437
  - H12, 515438

**Notes:**  
WV 514464 coordinates are  
NAD 27 N: 328,522.18 E: 1,629,439.25  
NAD 27 Lat: 39.394563 Long: -80.811235  
NAD 83 UTM N: 4,360,589.14 E: 516,269.20  
WV 514464 Landing Point coordinates are  
NAD 27 N: 327,694.99 E: 1,628,675.02  
NAD 27 Lat: 39.392261 Long: -80.813896  
NAD 83 UTM N: 4,360,333.24 E: 516,040.58  
WV 514464 Bottom Hole coordinates are  
NAD 27 N: 316,863.77 E: 1,633,272.60  
NAD 27 Lat: 39.362710 Long: -80.797077  
NAD 83 UTM N: 4,357,056.89 E: 517,496.30

West Virginia Coordinate system of 1927 (North Zone) based upon Differential GPS Measurements. Plat orientation, corner and well ties are based upon the grid north meridian. Well location references are based upon the grid north meridian. UTM coordinates are NAD83, Zone 17, Meters.



- 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

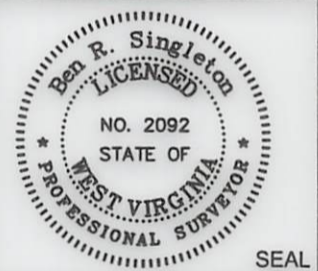
**Sub Surface Easements**

| Parcel No. | Acres  | Owner                     |
|------------|--------|---------------------------|
| 05-18-7.1  | 102.31 | Brenda J. Ashley, et vir. |
| 05-18-7.1  | 102.31 | Patricia A. Keys          |

| Lease No. | Acres | Owner                            |
|-----------|-------|----------------------------------|
| 126164    | 113   | Stephen Seckman, et al.          |
| 126124    | 60    | Donald Bible, et al.             |
| 126167    | 43    | Berdina Rose, et al.             |
| 126211    | 145   | John A. Dillon, et al.           |
| 190034    | 36    | Paul Weekley                     |
| 126186    | 36    | Bruce L. Stoneking, et al.       |
| 126268    | 36    | Logan Hassig, et al.             |
| 126133    | 40    | Dorothy H. Bode                  |
| 105456    | 96    | Kimberly Wilcox                  |
| 126138    | 82    | Sandra Lee Freeman-Corao, et al. |
| 126237    | 56    | Brenda Jane Becker, et al.       |



*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.*



P.S. 2092

FILE NO: 208-13  
DRAWING NO: 208-13 SHR 60 H5  
SCALE: 1" = 2000'  
MINIMUM DEGREE OF ACCURACY: 1:2500  
PROVEN SOURCE OF ELEVATION: NGS CORS Station



DATE: October 7 20 16  
OPERATOR'S WELL NO.: WV 514464  
API WELL NO  
47 - 95 - 02256  
STATE COUNTY PERMIT

WELL TYPE:  OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  
(IF GAS) PRODUCTION:  STORAGE  DEEP  SHALLOW  
LOCATION: ELEVATION: As-Built 1,011' WATERSHED Morrison Run of McElroy Creek QUADRANGLE: Shirley  
DISTRICT: McElroy COUNTY: Tyler  
SURFACE OWNER: Vivian J. Wells, et al. ACREAGE: 35.38  
ROYALTY OWNER: George Birklein, et al. LEASE NO: 126101 ACREAGE: 240  
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: 6596

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

01/20/2017