



---

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](http://www.dep.wv.gov)

## PERMIT MODIFICATION APPROVAL

February 21, 2014

EQT PRODUCTION COMPANY  
POST OFFICE BOX 280  
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 1706056 , Well #: 513167 - CARR  
**Changed formation and lateral length**

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,

for

Gene Smith

Regulatory/Compliance Manager  
Office of Oil and Gas



October 17, 2013

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

Re: Modification of 47-017-06056 (513167)

Dear Mr. Smith,

Attached is a modification of the above well. The modification is to change the length of the horizontal leg. I have included for your review a new WW-2B, schematics, WW-6A1, and mylar.

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

~ Enc.



MCD

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 Operator ID 017 County 3 District 611 Quadrangle

2) Operator's Well Number: 513167-Carr Well Pad Name: SMI27

3) Farm Name/Surface Owner : Carr Public Road Access: CR 3/1

4) Elevation, current ground: 1198' Elevation, proposed post-construction: 1179'

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 Genesee at a depth of 6,908 with the anticipated thickness to be 28 feet and anticipated target pressure of 4,635 PSI

8) Proposed Total Vertical Depth: 5,626

9) Formation at Total Vertical Depth: Genesee

10) Proposed Total Measured Depth: 16,756

11) Proposed Horizontal Leg Length: 7,430

12) Approximate Fresh Water Strata Depths: 25', 344', 444', 654', 849', 919'

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

14) Approximate Saltwater Depths: 1,187

15) Approximate Coal Seam Depths: none

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? No

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

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

MOD

**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
Fresh Water	13 3/8	New	MC-50	54	1,019	1,019	884
Coal							
Intermediate	9 5/8	New	MC-50	40	5,327	5,327	2,092
Production	5 1/2	New	P-110	20	16,756	16,756	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							

AC for DU

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20	24	0.635	-	Construction	1.18
Fresh Water	13 3/8	17 1/2	0.380	2,480	1	1.21
Coal						
Intermediate	9 5/8	12 3/8	0.395	3,590	1	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.

RECEIVED  
Office of Oil and Gas  
OCT 1 8 2013  
WV Department of  
Environmental Protection

02/28/2014

WW - 6B

(3/13)

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

Drill and complete a new horizontal well in the Genesee formation. The vertical drill to go down to an approximate depth of 5,626'.  
Then kick off the horizontal leg into the Genesee 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): no additional acreage

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

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.

\*Note: Attach additional sheets as needed.

*[Faint handwritten notes and stamps]*

02/28/2014

Well 513157 (SM127H6)  
 EOT Production  
 Smithburg  
 Doddridge West Virginia

Azimuth 155  
 Vertical Section 8219

TVD Depth (feet)	Formation Tops (TVD)	Hole Size (inches)	Casing Type	Casing Size (inches)	WT (ppH)/Grade
0		24	Conductor	20	
250'					
500'					
750'					
1,000'	Base First Water 919	17 1/2	Surface	13 3/8	54#/MC-50
1,250'					
1,500'					
1,750'					
2,000'	Marathon 2529 2600 (2000) Rig Line 2100 2264 Big Horn 2261 2131				
2,250'					
2,500'	Wye 2536 2500 Gard 2607 2722 Fry Foot 2734 2792 Truly Foot 2874 2898 Gordon 2860 3024 (3000) North Sand 3024 3122 1000 Sand 3122 3199				
3,250'					
3,500'	Warren 3308 3654 Specterly 3405 3504				
3,750'					
4,000'	Stalben 4034 4468				
4,250'					
4,500'	Haddard 4406 4500				
4,750'					
5,000'					
5,250'	Eberson 4773 4760 Wt. Fract 5327	12 3/8	Intermediate	9 5/8	40#/MC-50
5,500'	Alexander 5302 5717				
5,750'					
6,000'					
6,250'	Donysa 6431 6725 Maddox 6773 6906 Zandora 8009 8091				
6,500'					
6,750'	Target Inside Genesee 6908 Genesee Top 6941 Genesee Bottom 8919	8 1/2	Production Casing	5 1/2	20#/P-110
7,000'					
7,250'					
7,500'					



Proposed Well Work:  
 Drill and complete a new horizontal well in the Genesee formation.  
 The vertical drill to go down to an approximate depth of 5626'.  
 Then kick off the horizontal leg into the Genesee using a slick water frac.

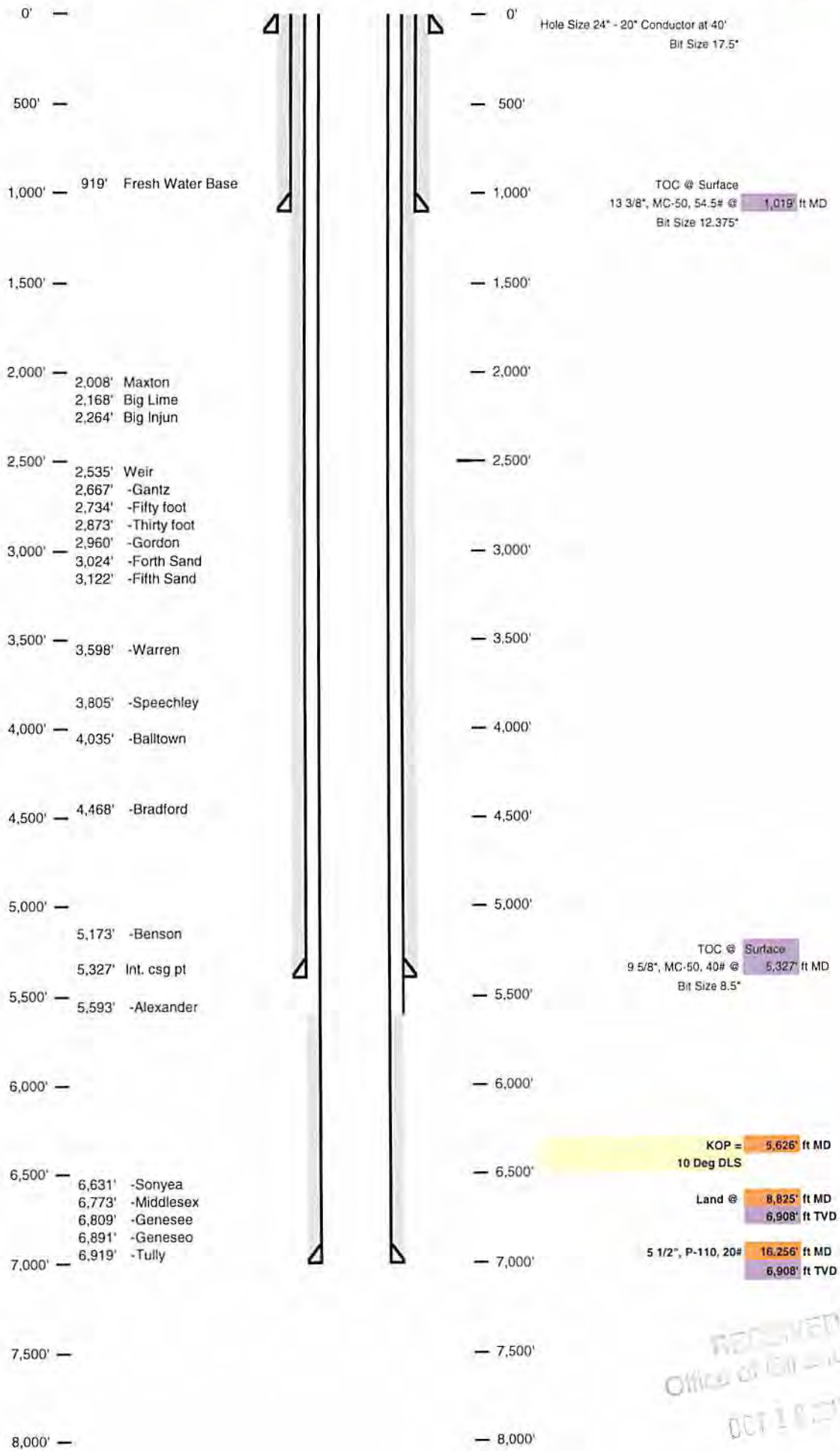
RECEIVED  
 Office of Oil and Gas  
 OCT 1 8 2013  
 WV Department of  
 Environmental Protection

02/28/2014

Well Schematic  
EQT Production

Well Name: 513167 (SM127R16)  
County: Doddridge  
State: West Virginia

Elevation KB: 1189  
Target: Genesee  
Prospect: 155  
Azimuth: 8219  
Vertical Section:



RECEIVED  
Office of Oil and Gas

OCT 1 2013

WV Department of Environmental Protection

02/28/2014

WELL NO. WV 513167  
STATE PLANE COORDINATES  
NORTH ZONE (NAD 27)

N. 318,180.0  
E. 1,661,528.3

LAT=(N) 39.367400  
LONG=(W) 80.697214

UTM (NAD'83)(METERS)  
N. 4,357,601.7  
E. 526,097.8

# EQT PRODUCTION COMPANY WELL NO. WV 513167 CARR LEASE 351 AC±

LONGITUDE 80° 40' 00"

- A- M. BERAM (9.57 AC±)
- B- C.L. IRWIN (15.13 AC±)
- C- C.L. IRWIN (8.05 AC±)
- D- D.E. LOWE (21.36 AC±) TM-26.8
- E- D.E. LOWE (22.28 AC±) TM-26.7
- F- M. & A. BERAM (20.65AC±) TM 6-21.3

LANDING POINT  
WELL NO. WV 513167  
STATE PLANE COORDINATES  
NORTH ZONE (NAD 27)

N. 316,774.1  
E. 1,659,522.4

LAT=(N) 39.363467  
LONG=(W) 80.704241

UTM (NAD'83)(METERS)  
N. 4,357,163.2  
E. 525,493.9

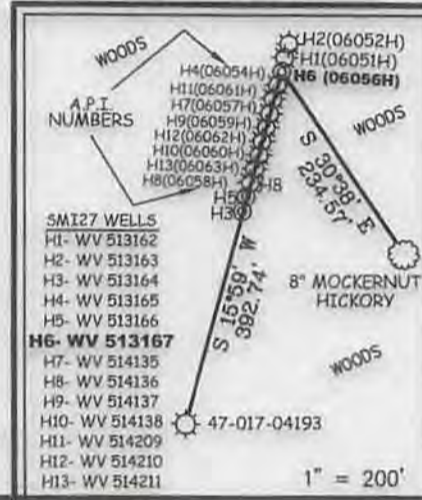
BOTTOM HOLE  
WELL NO. WV 513167  
STATE PLANE COORDINATES  
NORTH ZONE (NAD 27)

N. 310,040.2  
E. 1,662,662.5

LAT=(N) 39.345095  
LONG=(W) 80.692820

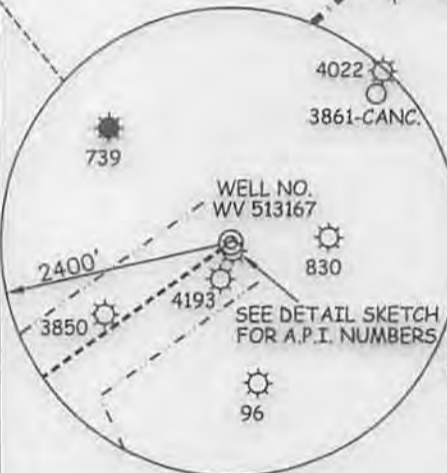
UTM (NAD'83)(METERS)  
N. 4,355,127.7  
E. 526,484.7

## REFERENCES



- SMI27 WELLS
- H1- WV 513162
  - H2- WV 513163
  - H3- WV 513164
  - H4- WV 513165
  - H5- WV 513166
  - H6- WV 513167
  - H7- WV 514135
  - H8- WV 514136
  - H9- WV 514137
  - H10- WV 514138
  - H11- WV 514209
  - H12- WV 514210
  - H13- WV 514211

NORTH



- ### NOTES ON SURVEY
1. TIES TO WELLS, CORNERS & REFERENCES ARE BASED ON GRID NORTH FOR THE WV STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD '27.
  2. LEASE BOUNDARY SHOWN HEREON TAKEN FROM DEED BOOK 185 PAGE 459 & DEED BOOK 29 PAGE 255.
  3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF DODDRIDGE COUNTY IN JULY, 2013.
  4. WELL LAT./LONG. (NAD'27 ESTABLISHED BY DGPS (SURVEY GRADE).
  5. ORIGINAL PLAT DATED 07/26/11, REVISED 08/02/11, 09/23/11, 10/12/11, 01/28/13 AND 10/09/13.



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.



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

DATE OCTOBER 09 , 20 13

OPERATORS WELL NO. WV 513167

API WELL NO. 47-018-06056 MOD H6A

STATE            COUNTY            PERMIT           

P.S. 677 Gregory A. Smith

MINIMUM DEGREE OF ACCURACY 1/200 FILE NO. 7584P513167R4F4 (350-57)

PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

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

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

LOCATION: ELEVATION 1,198' (GROUND) / 1,179' (PROPOSED) WATERSHED BRUSH RUN

DISTRICT GRANT COUNTY DODDRIDGE QUADRANGLE SMITHBURG 7.5'

SURFACE OWNER BETH CROWDER & DAVID WENTZ ACREAGE 30±

ROYALTY OWNER PATTY J. & R. KEITH CRIHFIELD (351 AC±) / NEVA RITTER ET AL (907 AC±) / EDISON RITTER ET AL (1600 AC±)

PROPOSED WORK: DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE  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 5626

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

COUNTY NAME PERMIT

02/28/2014