



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

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.

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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	District	3	Quadrangle	611
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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 Geneseo 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: Geneseo

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: _____

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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							

AL 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.

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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 Geneseo formation. The vertical drill to go down to an approximate depth of 5,626'.
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): 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.

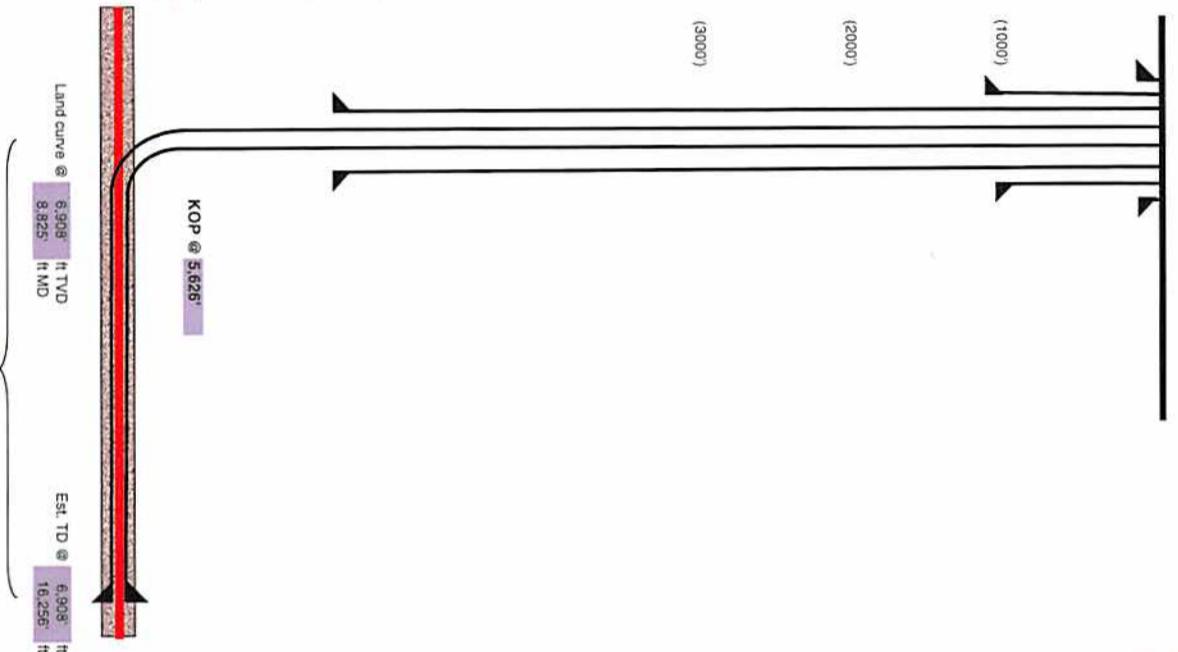
Perform a cleanup cycle by pumping 3-5 bottoms up or until the shakers are clean. Check volume of cuttings coming across the shakers every 15 minutes.

*Note: Attach additional sheets as needed.

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Well 513167 (SM127H6)
EOT Production
Smithsburg
Doddridge
West Virginia
Azimuth 155
Vertical Section 8219

TVD Depth (feet)	Formation Tops (TVD)	Hole Size (inches)	Casing Type	Casing Size (inches)	WT (ppb)/Grade
0		24	Conductor	20	
250'		17 1/2	Surface	13 3/8	54#/MC-50
500'					
750'					
1,000'	Base Fresh Water 919				
1,250'					
1,500'					
1,750'					
2,000'	Marathon 2608 - 2600 (2000) Big Line 2168 - 2264 Big Run 2264 - 2431				
2,250'					
2,500'	Wet 2538 - 2600 Gantz 2667 - 2722 Ferry foot 2734 - 2782 Thyng foot 2873 - 2898 Gordon 2960 - 3024 Fourth Sand 3024 - 3122 Fifth Sand 3122 - 3199				
3,000'					
3,250'					
3,500'					
3,750'	Warren 3308 - 3654 Speckley 3805 - 3904				
4,000'	Barlow 4038 - 4458				
4,250'					
4,500'	Bladford 4488 - 4560				
4,750'					
5,000'					
5,250'	Benson 5178 - 5240 Wt. cap pt 4327	12 3/8	Intermediate	9 5/8	40#/MC-50
5,500'	Avondale 5593 - 5717				
5,750'					
6,000'					
6,250'					
6,500'	Sonyia 6631 - 6725 Middlebelt 6773 - 6809 Gardner 6809 - 6891				
6,750'					
7,000'	Target Inside Genesee 6908 Genesee Bottom 6919	8 1/2	Production Casing	5 1/2	20#/P-110



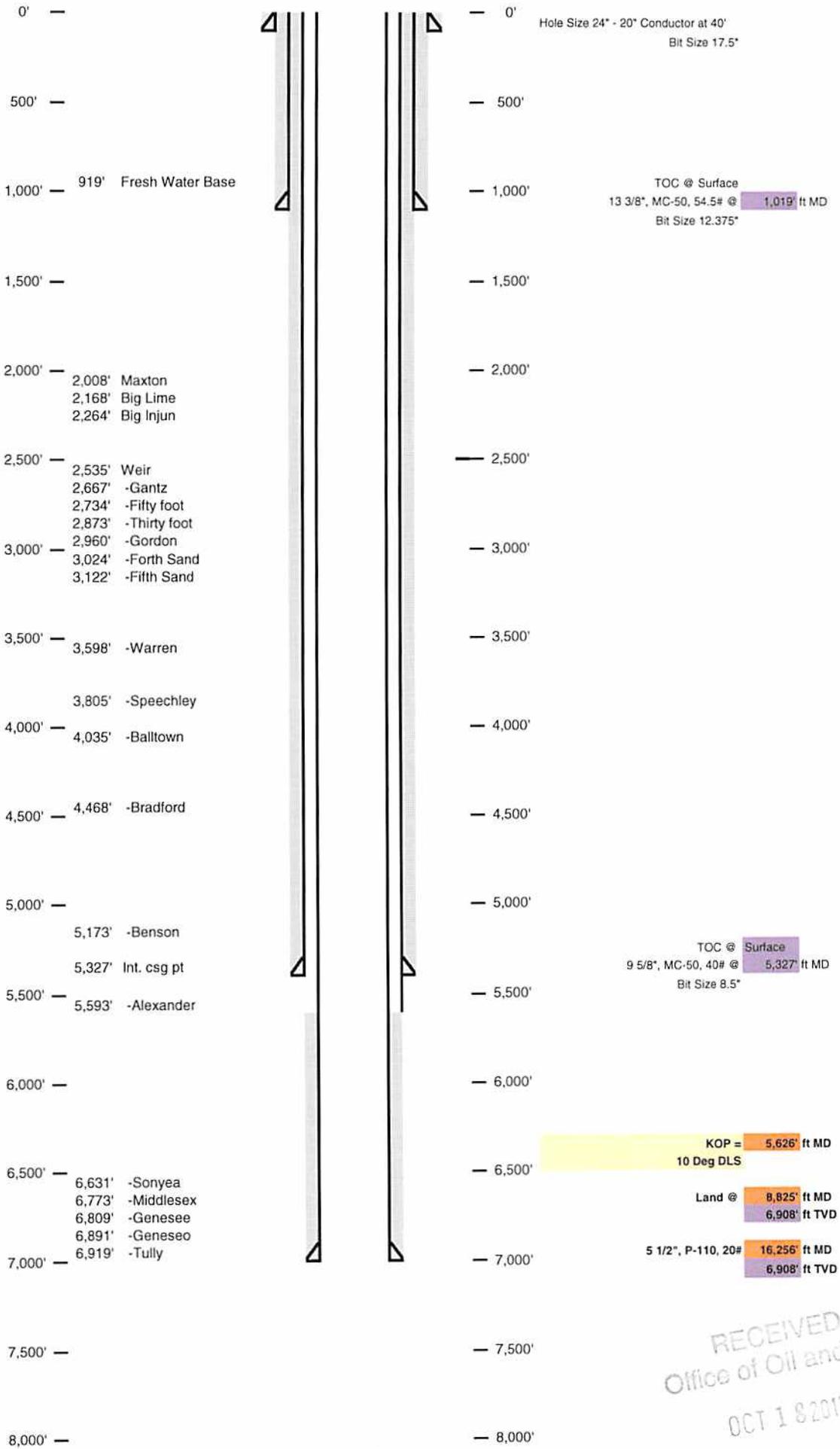
Proposed Well Work:
Drill and complete a new horizontal well in the Genesee formation.
The vertical drill to go down to an approximate depth of 5626'.
Then kick off the horizontal leg into the Genesee using a slick water frac.

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Well Schematic
EQT Production

Well Name: 513167 (SMI27H6)
County: Doddridge
State: West Virginia

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



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