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

December 17, 2013

EQT PRODUCTION COMPANY
POST OFFICE BOX 280
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 10302734, Well #: 513925 EQT PRODUCTIC
move and extend horizontal leg

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,

Chad Carmichael

for Gene Smith
Regulatory/Compliance Manager
Office of Oil and Gas

October 30, 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 47-10302734

Dear Mr. Smith,

Attached is a modification to the above well. The top hole has NOT changed from the original application however, we have moved the horizontal leg and extended it. I am enclosing a new WW-6B, WW-6A1,well schematics and a mylar plat.

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

Sincerely,

Vicki Roark
Permitting Supervisor-WV

Enc.

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OCT 31 2013

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V - 6B
(3)

4710302734 Mod

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

Well Operator: EQT Production Company

	103	4	254
Operator ID	County	District	Quadrangle

Operator's Well Number: 513925 Well Pad Name BIG190

Farm Name/Surface Owner : Mills-Wetzel Public Road Access: CR 15/2

Elevation, current ground: 1,473.5 Elevation, proposed post-construction: 1,473.5

Well Type: (a) Gas • Oil _____ Underground Storage _____

Other _____

(b) If Gas: Shallow • Deep _____

Horizontal •

Existing Pad? Yes or No: YES

DAH
11-13-13

Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):

Target formation is Marcellus at a depth of 7525 with the anticipated thickness to be 62 feet and anticipated target pressure of 4764 PSI

Proposed Total Vertical Depth: 7,525
Formation at Total Vertical Depth: Marcellus
Proposed Total Measured Depth 14,215
Proposed Horizontal Leg Length 5,354
Approximate Fresh Water Strata Depths: 672, 677, 744
Method to Determine Fresh Water Depth: By offset wells
Approximate Saltwater Depths: n/a
Approximate Coal Seam Depths: 411, 1204, 1222
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: _____

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/W - 6B
/13)

103-02734
4710302734
Mod

CASING AND TUBING PROGRAM

3)

YPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: for Drilling	INTERVALS: Left in Well	CEMENT: Fill- up (Cu.Ft.)
onductor	20	New	Varies	Varies	40	40	38
resh Water	13 3/8	New	MC-50	54	844	844	738
oal							
termediate	9 5/8	New	MC-50	40	3,474	3,474	1,366
roduction	5 1/2	New	P-110	20	14,215	14,215	See Note 1
ubing	2 3/8		J-55	4.6			May not be run, if run will be set 100' less than TD
ners							

YPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
onductor	20	24	0.635	-	Construction	1.18
esh Water	13 3/8	17 1/2	0.380	2,485	1	1.21
oal						
termediate	9 5/8	12 3/8	0.395	3,600	1	1.21
roduction	5 1/2	8 1/2	0.361	12,640	-	1.27/1.86
ubing						
ners						

Packers

DmH
11-13-13

ind:	N/A			
izes:	N/A			
epths Set:	N/A			

ote 1: EQT plans to bring the TOC on the production casing cement job 1,000' above kick off point, which is at ast 500' above the shallowest production zone, to avoid communication.

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103-02734

4710302734

Mod

9) 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. The vertical drill to go down to an approxmate depth of 5654'. Then kick off the horizontal leg into the Marcellus using a slick water frac.

0) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

ydraulic fracturing is completed in accordance with state regulations using water recycled from previously fractured wells and obtained from shwater sources. This water is mixed with sand and a small percentage (less than 0.3%) of chemicals (including 15% Hydrochloric acid, lling agent, gel breaker, friction reducer, biocide, and scale inhibitor), referred to in the industry as a "slickwater" completion. Maximum ticipated treating pressures are expected to average approximately 8500 psi, maximum anticipated treating rates are expected to average pproximately 100 bpm. Stage lengths vary from 150 to 300 feet. Average approximately 200,000 barrels of water per stage. Sand sizes ary from 100 mesh to 20/40 mesh. Average approximately 200,000 pounds of sand per stage.

1) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): no additional disturbance

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

3) Describe centralizer placement for each casing string.

Surface: Bow spring centralizers – One at the shoe and one spaced every 500'.

ntermediate: Bow spring centralizers– One cent at the shoe and one spaced every 500'.

Production: One spaced every 1000' from KOP to Int csg shoe

4) Describe all cement additives associated with each cement type. **Surface (Type 1 Cement):** 0-3% Calcium Chloride ed to speed the setting of cement slurries.

4% flake. Loss Circulation Material (LCM) is used to combat the loss of the cement slurry to a thief zone.

termediate (Type 1 Cement): 0-3% Calcium Chloride. Salt is used in shallow, low temperature formations to speed the setting of cement urries. 0.4% flake. Loss Circulation Material (LCM) is used to combat the loss of whole drilling fluid or cement slurry (not filtrate) a thief zone.

oduction:

ad (Type 1 Cement): 0.2-0.7% Lignosulfonate (Retarder). Lengthens thickening time.

3% CFR (dispersant). Makes cement easier to mix.

ail (Type H Cement): 0.25-0.40% Lignosulfonate (Retarder). Lengthens thickening time.

2-0.3% CFR (dispersant). This is to make the cement easier to mix.

% Calcuim Carbonate. Acid solubility.

4-0.6% Halad (fluid loss). Reduces amount of water lost to formation.

5) Proposed borehole conditioning procedures. **Surface:** Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating e full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 inutes. To ensure that there is no fill, short trip two stands with no circulation. If there is fill, bring compressors back on d circulate hole clean. A constant rate of higher than expected cuttings volume likely indicates washouts that will not clean up.

termediate: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at rface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. If foam drilling, to enhance le cleaning use a soap sweep or increase injection rate & foam concentration.

oduction: Pump marker sweep with nut plug to determine actual hole washout. Calculate a gauge holes bottoms up volume. erform a cleanup cycle by pumping 3-5 bottoms up or until the shakers are clean. Check volume of cuttings coming across e shakers every 15 minutes.

Note: Attach additional sheets as needed.

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11-13-13

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4710302734

Mod

Well Schematic
EQT Production

Well Name	513925 (BIG190H9)
County	Wetzel
State	West Virgina

Elevation KB:	1482
Target	Marcellus
Prospect	
Azimuth	342
Vertical Section	5764.5

0'

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

417' Mapletown Coal

500'

744' Fresh Water Base

TOC @ Surface
13.375", 54.5#, MC-50, New @ 844' ft MD
Bit Size 12.375"

1,000'

1,211' Pittsburgh Coal
1,228' Coal

1,500'

2,000'

2,248' Maxton
2,374' Big Lime
2,362' Base Red Rock

2,500'

2,506' Big Injun

2,752' Weir
2,923' -Gantz
3,009' -Fifty foot
3,100' -Thirty foot
3,156' -Gordon
3,227' -Forth Sand
3,379' -Bayard
3,474' Int. csg pt

3,000'

TOC @ Surface
9.625", 40#, MC-50, New @ 3,474' ft MD
Bit Size 8.5"

3,500'

3,850' -Warren

3,999' -Speechley

4,000'

4,400' -Balltown A

4,500'

4,841' -Riley

5,000'

5,471' -Benson

5,500'

Dmh
11-13-13

5,858' -Alexander

6,000'

7,062' -Sonyea
7,230' -Middlesex
7,269' -Genesee
7,370' -Geneseo
7,400' -Tully
7,430' -Hamilton
7,500' -Marcellus
7,562' Onondaga

7,000'

7,500'

KOP = 5,654' ft MD
10 Deg DLS

Land @ 8,362' ft MD
7,525' ft TVD

5.5", 20#, P-110, New @ 13,715' ft MD
7,491' ft TVD

6,500'

7,000'

7,500'

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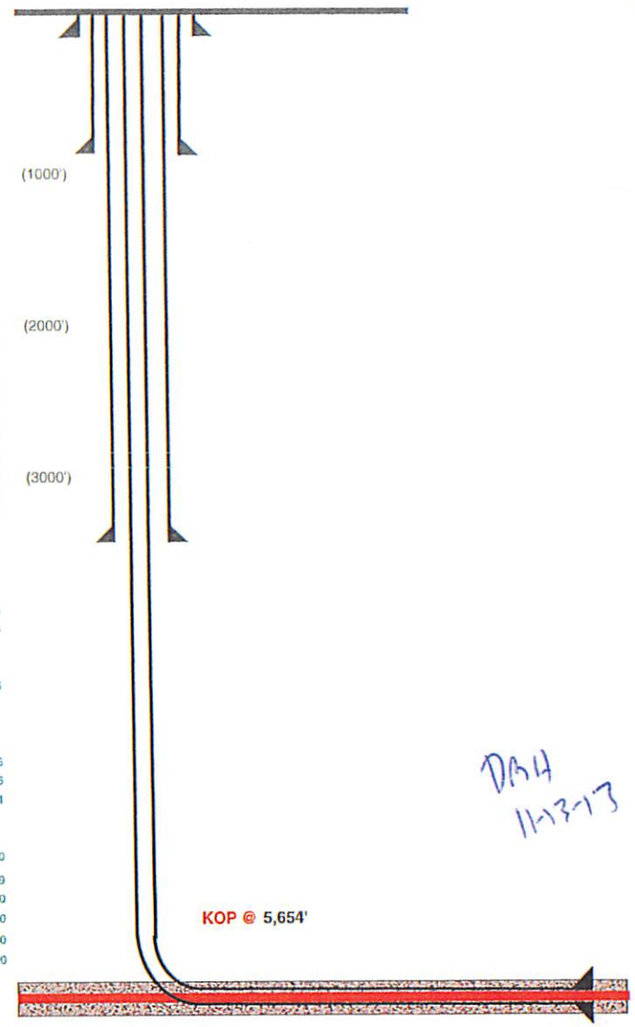
Mod

Well 513925 (BIG190H9)
EQT Production
Pine Grove
Wetzel West Virgina

Azimuth 342
Vertical Section 5764.5

TVD Depth (feet)	Formation Tops (TVD)		
0'			
250'			
	Mapletown Coal	417	
500'			
750'	Base Fresh Water	744	
1,000'			(1000')
	Pittsburgh Coal	1211	
1,250'	Coal	1228	
1,500'			
1,750'			
2,000'	Maxton	2248 - 2303	(2000')
	Big Lime	2374 - 2474	
2,250'	Base Red Rock	2362	
	Big Injun	2505 - 2752	
2,500'	Weir	2752 - 2804	
	-Gantz	2923 - 2968	
2,750'	-Fifty foot	3009 - 3044	
	-Thirty foot	3100 - 3159	
3,000'	-Gordon	3156 - 3226	(3000')
	-Forth Sand	3227 - 3263	
3,250'	-Bayard	3379 - 3424	
	Int. csg pt	3474	
3,500'			
3,750'			
	-Warren	3850 - 3906	
4,000'	-Speechley	3999 - 4046	
4,250'			
	-Balltown A	4400 - 4496	
4,500'			
4,750'			
	-Riley	4841 - 4936	
5,000'	-Benson	5171 - 5526	
	-Alexander	5858 - 6021	
6,000'			
6,500'	-Sonyea	7062 - 7230	
	-Middlesex	7230 - 7269	
7,000'	-Genesee	7269 - 7370	
	-Genesee	7370 - 7400	
	-Tully	7400 - 7430	
7,250'	-Hamilton	7430 - 7500	
	Marcellus top	7500	
	Target Inside Marcellus	**7525**	
7,500'	Onondaga	7562	



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

DAH
11-13-13

Land curve @ 7,525' ft TVD
8,362' ft MD

Est. TD @ 7,491' ft TVD
13,715' ft MD

5,354' ft Lateral

Run Logs, Plug back to KOP at 5654
Kick off for horizontal well in Marcellus

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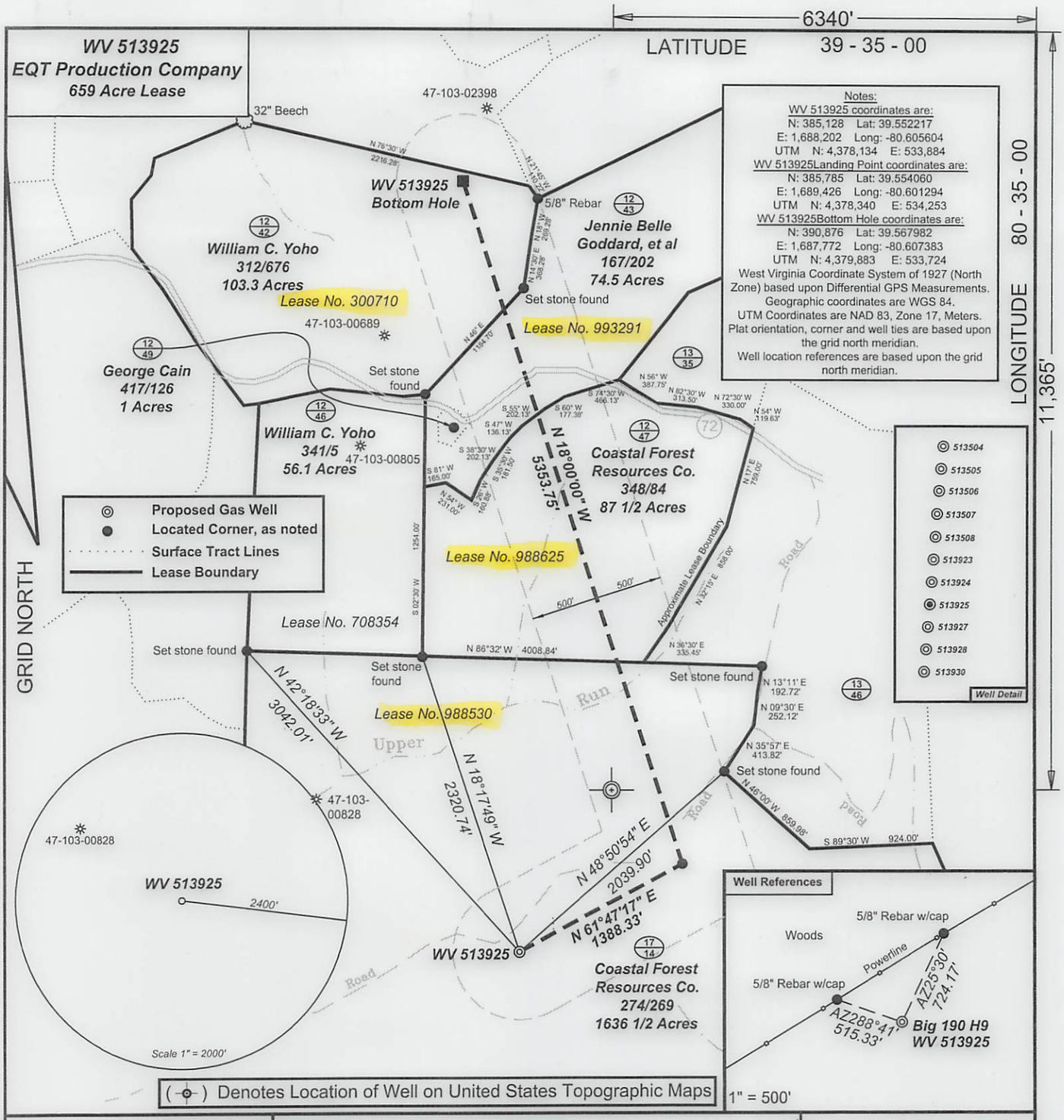

Allegheny Surveys, Inc. Established 1988

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

Ben R. Singleton LICENSED NO. 2092 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

SEAL

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

FILE NO: 196-34-G-10
DRAWING NO: 196-10 Big 190 H9 Plat.dwg
SCALE: 1" = 1000'
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 23 20 13
OPERATOR'S WELL NO. WV 513925
API WELL NO Mod
47 - 103 - 02734 H6A
STATE COUNTY PERMIT

WELL TYPE: ☐ OIL ☒ GAS ☐ LIQUID INJECTION ☐ WASTE DISPOSAL
(IF GAS) PRODUCTION : ☐ STORAGE ☐ DEEP ☒ SHALLOW

LOCATION: ELEVATION: 1473.5' (As-built) WATERSHED Upper Run and North Fork QUADRANGLE: Big Run
DISTRICT: Grant COUNTY: Wetzel
SURFACE OWNER: Coastal Forest Resources Co. f/k/a Coastal Lumber Company ACREAGE: 1,636.5
ROYALTY OWNER: Mills-Wetzel Land, Inc., Piney Holdings Inc. et. al., Barbara Ann Roche et. al., James Douglas White et. al. LEASE NO: 988530, 988625 993291, 300710 ACREAGE: 659, 87.5, 74.5, 103.3
PROPOSED WORK: ☒ DRILL ☐ CONVERT ☐ DRILL DEEPER ☒ FRACTURE OR STIMULATE ☐ PLUG OFF OLD FORMATION
☐ PERFORATE NEW FORMATION ☐ OTHER PHYSICAL CHANGE IN WELL (SPECIFY)
☐ PLUG AND ABANDON ☐ CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus ESTIMATED DEPTH: TVD=7,800 MD=15,550

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